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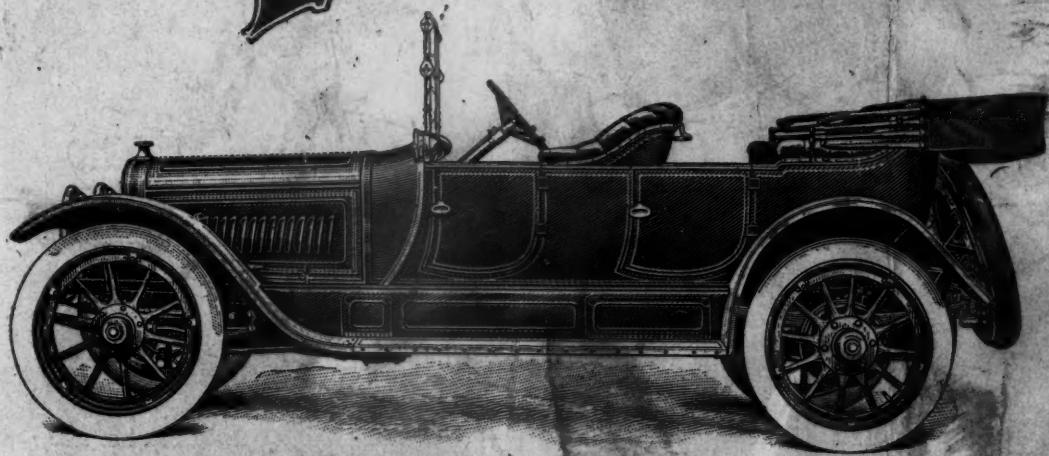
MOTOR AGE

VOLUME XXII

CHICAGO, DECEMBER 26, 1912

NUMBER 26

See the **Lozier** at the Show



LOZIER "LIGHT SIX"

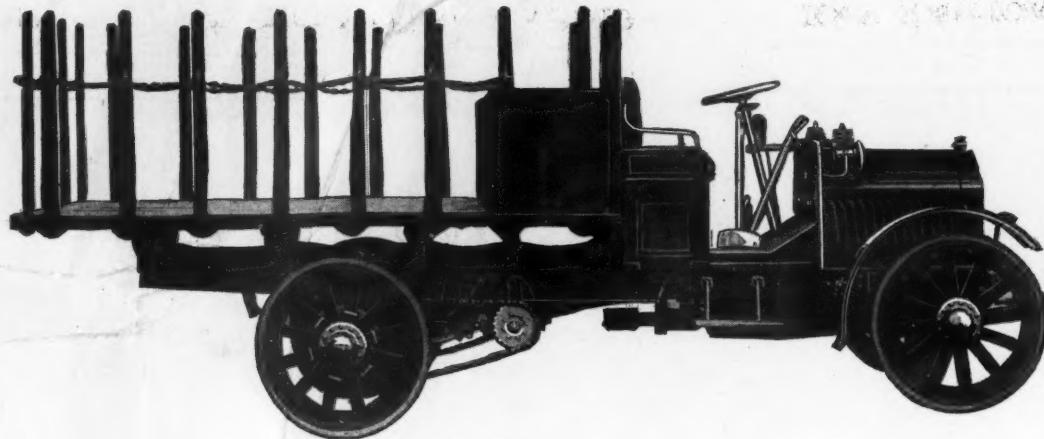
THE Lozier exhibit at the New York Show will be of greater interest this year than ever before, because of the 1913 addition to the Lozier Line—the Lozier "LIGHT SIX," a self-seller. This new Lozier, which so greatly increases Lozier sales possibilities, has been warmly welcomed by the trade. Through it, the Lozier dealer representation has been greatly broadened and we shall not be able to grant many more agencies, though there is still some unassigned territory. It may be your territory.

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The Selden One-Ton Truck **\$2000**

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We are selling this splendid motor truck **on time** and thus making a radical departure from the time honored custom of requiring a full cash payment upon delivery of car.

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The Selden truck embodies only practical, tried-out principles of construction and has every desirable feature to be found in the up-to-date high grade commercial car.

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*Low Price
Accessibility
Unit Power Plant*

*Long Stroke Motor
Center Control
Left Hand Drive*

*Dry Disc Clutch
Efficient Lubrication
Sturdy Construction*

*Efficiency and Economy
Sealed Motor Governor
Large Factor of Safety*

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We will exhibit at New York and Chicago Shows.

New York, January 20-25, Madison Square Garden, space 111 A; Chicago, Feb. 10-15, Coliseum, Section A.

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ROCHESTER, N. Y.



MOTOR AGE
Published by the
CLASS JOURNAL COMPANY
910 South Michigan Avenue
CHICAGO ILLINOIS

Volume XXII DECEMBER 26, 1912 No. 26

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and Real
Value Now
Recognized**

The only Anti-Skid device which can be relied upon and the only one in which absolute confidence can be placed.

Proven to be a necessity and not a luxury.

Weed Chains

"With the Creeping Grip"

No car is safe without them. They have stood the test of time and are regarded as the *most important* and profitable accessory handled and sold by automobile dealers. *Victory after victory* has perched on the banner of Weed Chains.

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Consider your own safety—Consider the safety of other road users. Take no chances.

Wise motorists are victorious in overcoming skidding accidents by the use of Weed Chains.

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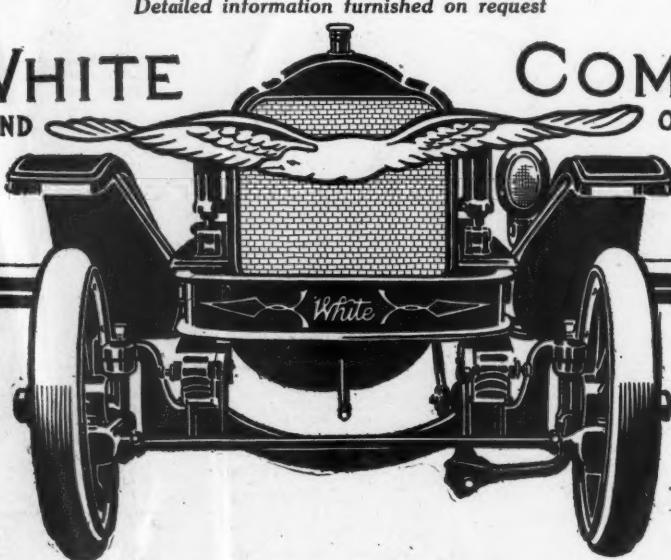
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MOTOR AGE

Milestones in Motoring in 1912

Happenings in the Trade and Sport



OLD FATHER TIME AND THE NEW YEAR READY FOR THE GETAWAY

CHICAGO, Dec. 24—Looking back over the 12 months of 1912 one feels that the American motor industry has had a very successful year. This is true not only of the trade end of it, but from the viewpoint of the owners themselves. The increase in the number of cars manufactured by American makers for the 1912 market shows a healthy increase, while the outlook for 1913 is that another 12 months will continue to show a legitimate

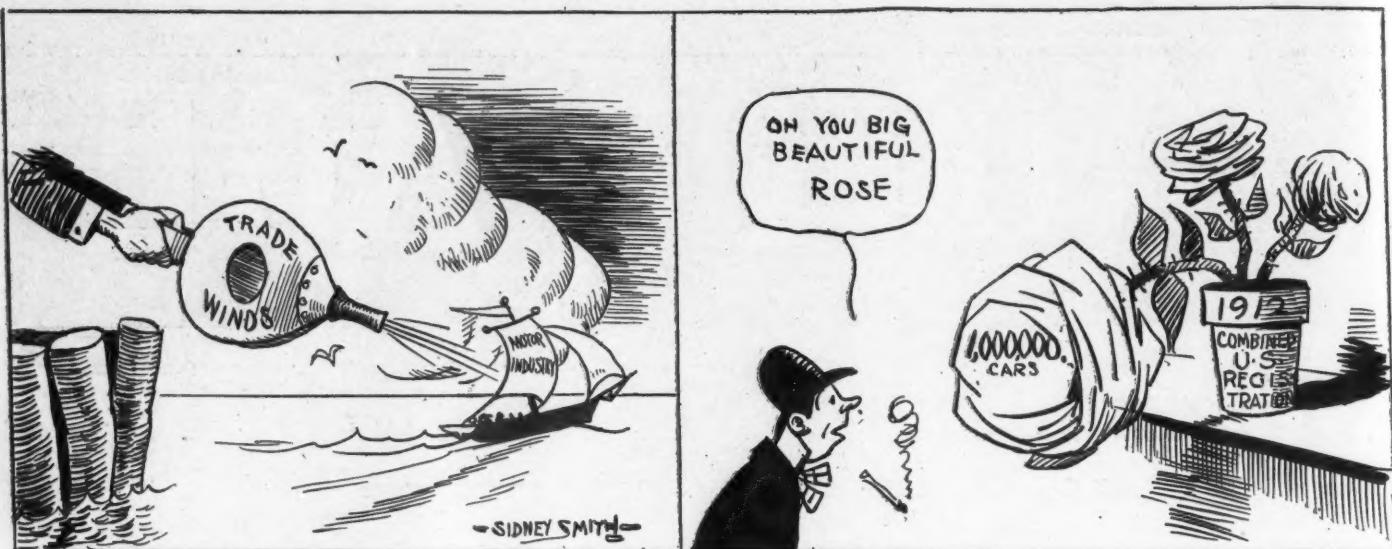
By C. G. Sinsabaugh

growth. The industry has struck some hidden notch in the turbulent sea of business, it is true, but now that the year is coming to an end one must admit that the troubles of the industry have not amounted to much after all.

There have been numerous failures it is true, but it would seem that these financial wrecks have done more to clarify the

atmosphere than anything else and to bear out the prediction made several years ago that with the motor industry it is the survival of the fittest. There have been numerous legal battles fought over patents, and doubtless there will continue to be such clashes, but in the main all this red-tape and court skirmishes are putting the industry on the substantial footing.

Standing out as milestones in the year in the trade way, are the failure of the



AS CARTOONIST SIDNEY SMITH VIEWS THE TRADE YEAR

United States Motor Co., the big holding corporation; the purchase of the Diamond Rubber Co. by the B. F. Goodrich Co.; the court decisions over the Dyer transmission patents and staggard tread patent. Many concerns have demonstrated their prosperity by increasing capital stock, and some new concerns have been put into existence that promise to be big factors in the industry from now on.

Million Cars Running

The year ends with more than 1,000,000 cars in operation in the United States, and it would seem that one could look for something like 300,000 to be added during the season of 1913. Of course, all of these cars were not made and sold in 1912, but it would not seem to be an exaggeration to place the 1912 output at something like 400,000 cars. This prediction is based on reports gathered in Detroit, which city it is claimed makes more than 50 per cent of the American product. Detroit made something like 187,000 cars in 1912, and it is thought that 1913 will see about 300,000 cars made in Michigan metropolis next year. Of this number Ford alone expects to more than double this year's output.

In the realm of the commercial car considerable progress is reported. A conservative estimate places the number of trucks and delivery wagons in use in the country at the present time at 50,000 as against 30,000 a year ago.

Taking the other side of the picture—the sporting angle—one finds that there has been considerable activity displayed, although perhaps not so much as in some of the other seasons. There has been less participation in contests by the manufacturers, but, on the other hand, the owners themselves have given considerable support to races and reliability runs. There were four big road-racing meets during the year and innumerable track races. There was no Glidden tour, but this was made up in many other ways.

Altogether one cannot help but be satisfied with 1912.

Active Year in American Motor Industry Reported

TRADE HAPPENINGS OF THE YEAR

Association of Licensed Automobile Manufacturers passes out of existence January 10, being succeeded by the Automobile Board of Trade.

United Motors' earnings for the last 6 months of 1911 announced to be \$10,332,087.

United States census bureau, in January, estimates the 1909 motor products were valued at \$249,202,000.

Rubber Goods Mfg. Co. announces its 1911 earnings to be \$3,607,896.

In April Goodyear declares 100 per cent dividend on common stock and increases its capital from \$6,000,000 to \$15,000,000.

Marion Sales Co. is bought from the Willys-Overland Co. by John I. Handley.

Buffalo Electric Co., capitalized at \$1,000,000, absorbs the Babcock electric and several other prominent makes.

In May the B. F. Goodrich Co. buys the Diamond Rubber Co. for \$15,000,000 worth of 7 per cent preferred stock and \$30,000,000 common.

Splitdorf and Alvord interests merge as the Splitdorf Electrical Co. with a capital of \$3,500,000.

Fire destroys the plant of the Lion Motor Car Co. at Adrian, Mich., in June, causing a loss of \$400,000.

W. J. Mead resigns as general manager of the Olds Motor Works to become president of the Amplex Motor Car Co., of Mishawaka, Ind.

John N. Willys buys the controlling interest in the Garford Co. in July and later on takes over the Gramm truck plant.

In July the Cole Motor Car Co. absorbs the Henderson Motor Sales Co. and decides to market its own product.

The Henderson Motor Car Co. is organized in Indianapolis.

In August H. A. Lozier resigns as presi-

dent of the Lozier company, being succeeded by H. M. Jewett.

F. H. Wheeler of Wheeler & Schebler buys the Mais truck plant and later in the year buys the interests of his partner, George Schebler.

United States Motor Co. is placed in a receiver's hands in September, with assets of \$12,250,000 and liabilities of \$15,300,000. Benjamin Briscoe resigns as president and W. E. Flanders is made general manager of the holding corporation.

During the fall months the manufacture of the Elmore and Marquette cars is discontinued.

United States circuit court of New York sustains the Mell patents in the suit of the Republic Rubber Co. against Morgan & Wright, but the United States court of appeals reverses the decision. The case has been appealed.

Validity of the Dyer transmission patents is sustained.

United States court of appeals decides against the Hartford in the Midgley tread suit.

Lovell-McConnell defeats the American Ever Ready Co. in Klaxon horn suit.

Judge Kohlsaat of the United States circuit court holds the Searchlight Gas Co. does not infringe Prest-O-Lite because of prior expiration of British claims.

Weed generally upholds its tire chain grip patent claims.

Decisions against the Knight patents are handed down in the case of Rolland-Pilain in France and the Argyll in England. Both cases have been appealed.

Louis Renault of France wins his suit sustaining the validity of the patents covering thermo-syphon cooling with a radiator dash.

Stewart-Warner Speedometer Co. buys the Stewart and Warner companies.

THE industry had a very active year, and there were many kaleidoscopic changes. A couple dozen concerns found it so hard sledding that they got into the courts; there are some new faces in the trade gallery as a result of the happenings of 1912, while the spring, summer and fall were marked by much litigation over patents pertaining to the motor car and its accessories.

The biggest deal of the year undoubt-

edly was the Goodrich-Diamond proposition, which started with the purchase of the Diamond by the Goodrich, which resulted in one of the most powerful tire-making corporations in the world. All the tire concerns had profitable seasons, judging by the reports of dividends declared, and while the season was marked by rumors of big mergers and combinations, the Goodrich-Diamond was the only one of consequence that materialized.

Next to the Goodrich-Diamond affair the most talked of event was the failure of the United States Motor Co., which went into the receivers' hands in September, with liabilities of \$12,250,000 and assets of \$15,300,000. There were all sorts of legal angles to the affair, and while it looks now as if the big holding corporation would come out with a clean bill of health, still matters will not be definitely settled until the judicial sale of the various properties takes place in New York, January 8. It is contemplated to move the headquarters of the United States Motor Co. to Detroit, where Walter Flanders will take charge of affairs, Benjamin Briscoe having resigned the presidency of the United Motors a couple of months back.

The other big holding corporation, the General Motors Co., had a very good year, judging by the report handed in at the annual meeting, which replaced Thomas Neal with C. W. Nash in the presidential chair.

Legal Troubles of Year

The United Motors is not the only concern in the industry that appeared in the courts during the year, the records showing that the following had legal troubles of some sort or another, either receivers being appointed, trustees named or creditors' committees taking hold: Carter Motor Corporation, Washington; Norwalk Motor Car Co., American Automobile Mfg. Co., Richmond Iron Works Corporation, Washington Motor Vehicle Co., Henry Motor Car Co., Muskegon, Mich.; DeTambles Motor Co., of Anderson, Ind.; Wyckoff, Church & Partridge Co., of New York; Clark Motor Car Co., of Shelbyville, Ind.; Duplex Power Car Co., Dorain Remountable Rim Co., Indiana Automobile and Mfg. Co., Atlas Engine Works, Grout Automobile Co., Mais Motor Truck Co., King Motor Car Co., E. R. Thomas Motor Car Co., Knox Automobile Co., Streator Motor Car Co., Dayton Automobile Co., Poss Motor Co., Grabowsky Power Wagon Co., Ohio

Motor Car Co., Flanders Mfg. Co., Lion Motor Car Co., Whitesides Commercial Truck Co. and Matheson Automobile Co.

Coupled with this there have been several reorganizations, notable among which have been the Empire Motor Car Co., of Indianapolis; the Berkshire Motor Co., of Cambridge, Mass.; the American Automobile Corp., New Albany, Ind.; Commercial Car Co., of Grand Rapids, Mich., formerly the Van-L company; Austin Automobile Co., Rutenber Motor Co., Independence Motor Co., which took over the Clark Motor Car Corporation, Hyattsville, Md.; Kelsey Motor Co., which succeeded the C. W. Kelsey Mfg. Co., and the Suburban Motor Co., which became the Palmer Motor Car Co.

The past year has seen some additions to the ranks of car manufacturers. Among the newcomers are the Henderson Motor Car Co., of Indianapolis; the Edwards Motor Car Co., of Long Island City; Steinbeck Engineering Co., of Peekskill, N. Y.; Century Electric Car Co., of Detroit; Gramm-Bernstein Motor Truck Co., Lima, O.; Continental Truck Mfg. Co., Superior, Wis.; Brown Commercial Car Co., Peru, Ind.; Duquesne Motor Car Co., Pittsburgh; Ideal Motor Car Co., of Akron, which since has become the Akron Motor Car and Truck Co.; Standard Motor Truck Co., of Detroit, and Tone Motor Car Co., of Indianapolis. Among the new ones in the accessory field, are: Janney Electric Starter Co., of Indianapolis; Simms Magneto Co., reorganized; Lyons-Atlas Co., which succeeded the Atlas Engine Works, and the Splitdorf Electrical and Mfg. Co., which is a merger of the Splitdorf and Alvord interests.

There were many cases of capital stock being increased, among which were the following: Willys-Overland Co., from \$6,000,000 to \$15,000,000, then to \$25,000,000; United States Rubber Co., from \$75,000,000 to \$120,000,000; B. F. Goodrich Co., from \$25,000,000 to \$45,000,000, then from \$45,000,000 to \$90,000,000 after the Diamond deal; J. I. Case Threshing

Machine Co., from \$5,000,000 to \$14,000,000; Chalmers Motor Co., of Detroit, to \$3,000,000, then to \$15,000,000; Federal Rubber Mfg. Co., from \$1,000,000 to \$2,000,000; Continental Motor and Mfg. Co., \$500,000 to \$2,400,000; Republic Rubber Co., \$4,000,000 to \$10,000,000; Locomobile Co. of America, \$5,000,000 to \$6,500,000; Pittsfield Spark Coil Co., \$100,000 to \$250,000; Marion Motor Car Co., \$100,000 to \$1,125,000; Krit Motor Car Co., \$250,000 to \$500,000; Argo Electric Vehicle Co., \$200,000 to \$400,000; McGraw Tire and Rubber Co., \$100,000 to \$250,000; Commerce Motor Car Co., \$25,000 to \$50,000; Chase Motor Truck Co., \$150,000 to \$50,000; G. & A. Carburetor Co., \$25,000 to \$100,000.

There were several removals of plants during the year, among which were the transfer of the Croxton Motor Car Co. to Washington, Pa.; the Keeton Motor Car Co. to Detroit, Castle Lamp Co. to Battle Creek, Mich., Penn Motor Car Co. to Newcastle, Pa., Marvel Carburetor Co. to Flint, Mich., while the Kline Motor Car Corporation at York, Pa., also opened a branch plant at Richmond, Va.

Litigation of the Year

There was considerable litigation in the courts. In January Judge Hazel, of the United States circuit court of New York, sustained the Mell patents, which have to do with the staggard tread, in the case of the Republic Rubber Co. against Morgan & Wright. In May the United States court of appeals reversed this decision, holding that Mell only improved the English-Healy idea. The Republic appealed this.

Another decision of importance was the decision handed down by Judge Kohlsaat, of the United States circuit court of Chicago, who decided that the Searchlight Gas Co. had not infringed the Prest-O-Lite patents because prior expiration of the British claim.

A far-reaching decision was that handed down in favor of the Enterprise Automobile Co., of Hoboken, N. J., sustaining the



validity of the Dyer transmission patents, five in all. The importance of this decision may be realized when it is known that immediately following the ruling of the court the Automobile Board of Trade arranged for manufacturing licenses for its members. These patents cover selective gearsets and direct drive epicyclic gearsets the right to use the change plate.

The Weed Chain Tire Grip Co. fought a number of successful suits in the court to sustain the validity of the patents covering tire chains. There were at least a half-dozen decisions handed down in favor of the Weed company. Another accessory concern that was very successful in its legal battles was the Lovell-McConnell Mfg. Co., which controls the Klaxon horn. The Avery Portable Lighting Co. won its suit against the Milwaukee Bronze Castings Co. for alleged infringement of the patents for lamp reflectors. The Fisk company defeated the DeLeski & Thropp patent on tire forming apparatus. The United States circuit court of appeals decided against the Hartford Rubber Works in a suit involving Midgely tread.

Foreign Decisions

In the foreign courts the chief events of interest were the decision sustaining Louis Renault in the matter of thermosyphon cooling with a radiator dash, and the Knight engine cases in France and England. A French court held that Roland-Pilain did not infringe the Knight patents, while in an English court the Knight-Argyll suit was decided in the favor of the latter, but an appeal was taken.

Another innovation of the year was the salesmen's convention that was held in Indianapolis in the fall, which brought out 400 manufacturers and dealers who spent two days in discussing business methods. This meeting resulted in the forming of permanent organization for the purpose of holding annual meetings of this sort.

The Society of Automobile Engineers has made decided progress during the last 12 months. At the present time there are 1,441 members in the society, about one-third of whom came in during 1912. The work of the standards committee has been particularly praiseworthy, as is shown by the report of Secretary Clarkson as to the various matters under consideration, which are progressing somewhat as follows:

The aluminum and copper alloys division is considering recommendation of specification for gear bronze, no specification for which has been submitted heretofore.

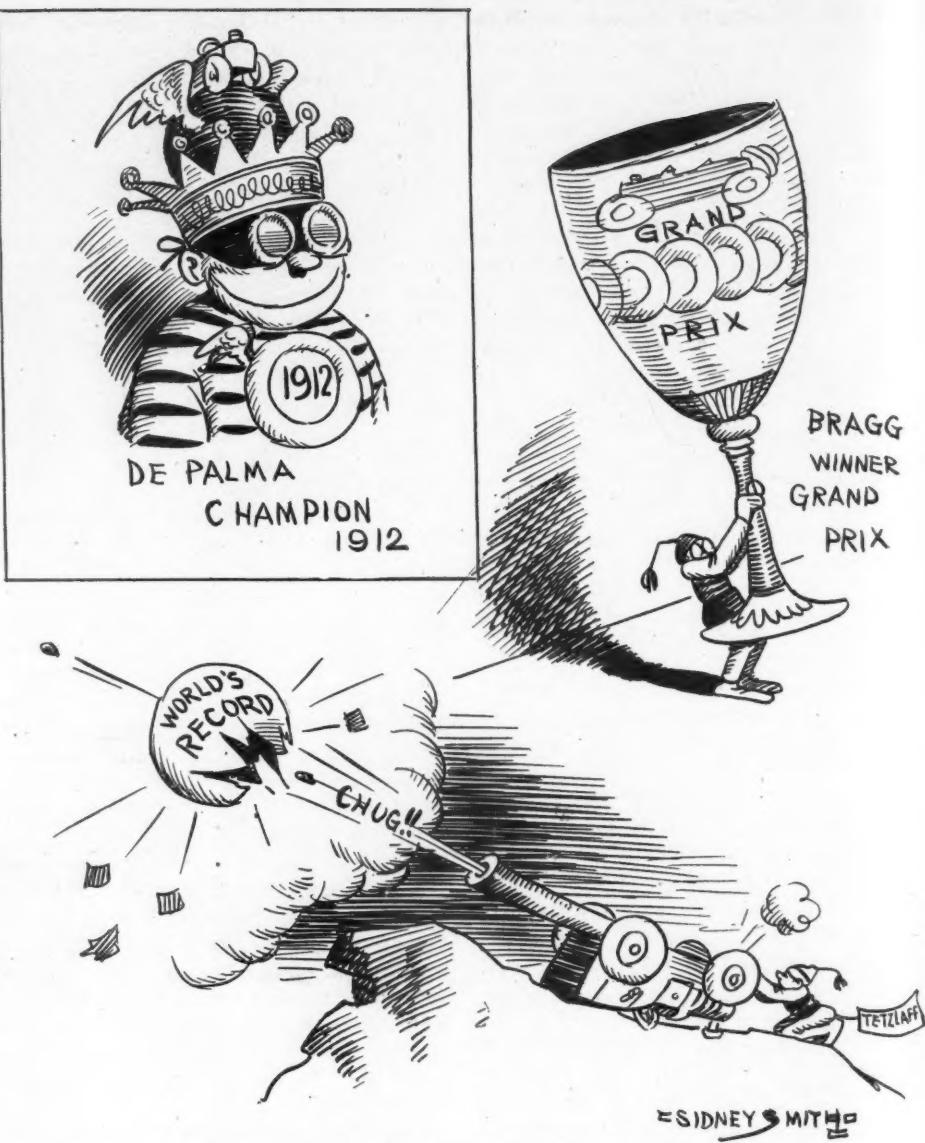
Ball and roller bearing division still has in hand some matters, the most important of which is the tolerance from precise measurement.

Broaches division proceeding slowly in comparison with its past work on account of the increased use of splined shafts developing new methods of manufacture. The work of the division so far as squared and tapered fittings are concerned is in a very satisfactory condition.

Carburetor fittings division will make no further recommendations at present.

Frame sections division conducting very interesting work in the nature of collecting data as to average and good practice in the manufacture of frames.

Gear tooth shapes division contemplating an extensive series of tests in connection with the committee of the American Society of Mechan-



DE PALMA, BRAGG AND TETZLAFF THE RACING STARS

ical Engineers and other scientific bodies. Sheet metal division working in the matter of reducing the multitude of unnecessary gages. Will probably submit some data on phosphor bronze, manganese bronze, etc.

Motor testing division carrying on very interesting work of recommending standard methods and report forms of testing motors. Also leading up to joint work with the universities and the government in laboratory and research work.

Springs division has in hand a report on leaf springs, recommendation of nomenclature in connection with the same, spring clips, shank

thread, shrunk center bands and specifications for ordering springs.

Truck standards division taking up for consideration a large amount of detail data collected as to current practice in truck construction.

Wheel dimensions and fastenings for tires division formulating a report on minor points supplementary to the establishment of the S. A. E. standard truck wheel and instructions as to the details of manufacture and inspection.

Motor car lighting systems considering points including wiring and insulation.

Shows Continue to Hold the Interest of the Public

SHOWS continue to enjoy a great popularity with the public, and 1912 saw no dearth of these exhibitions. The year opened with the usual national shows, there being two in New York and one in Chicago. In New York the Automobile Board of Trade, which succeeded to the estate of the Association of Licensed Automobile Manufacturers, promoted the show in the Madison Square garden, while the National Association of Automobile Manufacturers looked after the Grand Central palace affair. While these were two different shows, there was no great rivalry between the two great organizations, as shown by the fact that during the summer steps were taken to bring about a merger of the Automobile Board

of Trade and the N. A. A. M. When the 1913 show question came up it was decided that the Automobile Board of Trade should handle both the New York shows, which should be one exhibition, although held in two buildings. The N. A. A. M., as usual, kept control of the Chicago show in the Coliseum and armory.

In Europe the late fall was marked by two big affairs, the Olympia show in London, and the Paris salon in France. The salon was not held in 1911, it being the intention of the French to abandon shows altogether. The British, however, refused to enter into any such pact, and the success of the Olympia that year was so great that the French were forced to reinstate the salon to its calendar.

Road Racing Makes Ralph de Palma a Champion

RACING

Joe Dawson in a National wins the 500-mile race on the Indianapolis speedway at 78.7 miles per hour.

Teddy Tetzlaff in a Fiat breaks the world's road record at Santa Monica, averaging 78.7 miles per hour.

Ralph de Palma in a Mercedes wins the Elgin free-for-all, and Elgin National trophy at Elgin and the Vanderbilt cup at Milwaukee.

Caleb Bragg wins the grand prix at Milwaukee.

Milwaukee promoters lose \$43,000 on the Vanderbilt and grand prix meet.

Philadelphia's Fairmount Park road race is abandoned because of inability to get permission to use the course.

David Bruce-Brown killed training for Milwaukee grand prix.

French grand prix is won by Boillot in a Peugeot. Bruce-Brown and de Palma, Americans, disqualified for taking on fuel outside of controls.

RACING in 1912 flourished despite the attitude of many American manufacturers who kept aloof from the sport, leaving it up to the promoters to scare up entries as best they could. The promoters were forced to rely almost entirely upon free-lance drivers piloting foreign-made cars and to the sporting tendencies of wealthy owners who were willing to back famous speed merchants for the pure joy of seeing cars owned by them gather in the laurels, much as is the ease of rich turfmen who in the past maintained racing stables.

Road racing had a fairly good year. True, there were not so many events as in the past, but the ones that were run were well handled, more people than ever were attracted in the role of spectators, fast time was made as a rule, and, best of all, there were few accidents and no fatalities in the actual contests, although death claimed that brilliant star, David Bruce-Brown, and his mechanic, Seudaleri, killed in practice at Milwaukee.

Twenty Road Races Run

There were twenty races run in all, as compared with twenty-seven in 1911. This meant in reality four meets—Santa Monica, Elgin, Tacoma and Milwaukee, each having its feature event and having class races in addition. Besides this there were three others that could not be classified in this category. The Bakersfield road race was not over a circular course; neither were the Los Angeles-Phoenix and the San Diego-Phoenix races. Those two were from town to town and more nearly approached races over country roads than any others.

The major classics, of course, were the grand prix and Vanderbilt at Milwaukee, and the free-for-alls at Tacoma, Santa Monica and Elgin. They brought about the success of foreign cars in every instance, de Palma and his Mercedes winning the Vanderbilt and the two Elgin events; Tetzlaff scoring at Santa Monica and Tacoma in a Fiat, and Bragg in a

Fiat winning the grand prix at Milwaukee.

Financial success did not attend the efforts of the promoters of these classics. Milwaukee went into the hole to the tune of \$43,000 because of bad weather conditions that prevented the Brewers from completing their course in time and forcing two postponements and a reconstruction of the course that ran up into big money. Elgin lost a little, but feels as if it really made money in that the continuity of the meets was not broken. The Chicago Motor Club abandoned the Elginites, and had it not been for the Chicago Automobile Club jumping into the breach there would not have been any racing over the Kane county circuit.

One of the classics was abandoned, the Quaker City Motor Club being unable to secure the use of the Fairmount park course, the commissioners taking a firm stand against road racing because of the fear of accidents. It does not look as if there is any chance of reviving the affair for 1913.



While the world's road racing record was broken in 1912, the average speed of the different events was much slower than that of the preceding season. Tetzlaff started the season by raising the world's average to 78.7 miles per hour in the Santa Monica free-for-all, but after that the pace slackened and nothing approaching that mark was reached during the season. The grand prix was won at an average of 69.3 miles per hour, the Vanderbilt at 68.9, the Elgin free-for-all at 68.9, the Elgin national at 68.4 and the Tacoma free-for-all at 65.8. The Los Angeles-Phoenix produced a new record in the 28.2 miles per hour made by Hamlin in a Franklin over a distance of 511 miles.

Dirt Track Racing

Racing on dirt tracks was well handled and this branch of the sport for 1912 can be classed as a decided success. There were more meets than ever before, there were no fatalities in any sanctioned event, and what few accidents that did occur did not amount to anything. Undoubtedly all this is due to the new rules brought out

by the American Automobile Association, which are designed for the protection of the spectators, as well as the drivers. The features of these rules demand that the tracks be made dustless by oiling, that a danger zone be established which keeps the spectators at least 30 feet away from the track at turns, and gives the referee power to eliminate cars which he considers are not in racing condition. The record crop on the dirt tracks this year was a big one, Disbrow in the Simplex Zip landing most of the long distance marks, while Bob Burman in the Jumbo Benz dropped the mile mark to :46 at St. Louis.

Despite the fact that America has speedways at Indianapolis, Atlanta and Los Angeles, there was not much activity in this department. There was a small meet at Los Angeles following the Santa Monica races, while Indianapolis as usual staged its 500-mile race on Memorial day. The Hoosiers did not have as big an entry list as in the first year, but the contest itself was far more thrilling because of the sensational defeat of De Palma by Joe Dawson in the National.

The stock car had a sorry time of it this year because of the failure of the manufacturers to register with the A. A. A.

Road racing was revived in Europe during the year, and while there were not so many events as there were in the early days of motoring in Europe, still the French grand prix was a decided success, bringing out a field of 46 starters, which included 2 American drivers, Bruce-Brown and De Palma. The race was won by Boillot in a Peugeot, who traveled the 956 miles at the rate of 68.7 miles an hour. The race was a two-day affair and there also was a class for 183-inch cars, which was won by Rigal in a Sunbeam.

Happenings in Other Lines of Motor Sport in 1913

SPORTING EVENTS OTHER THAN RACING

American Automobile Association reinstates Premier company, suspended following the Glidden tour row of 1910.

Hupmobile globe-girdlers, who started from Detroit November 4, 1910, complete journey around the world January 15, 1911.

Frank Kulick in a Ford covers mile on the ice of Lake St. Clair at Detroit in :33%, equal to 109 miles an hour.

Warren-Detroit breaks the world's non-motor stop record, doing 12,406 miles at San Francisco.

Fuel economy test of the Quaker City Motor Club at Philadelphia is won by an American.

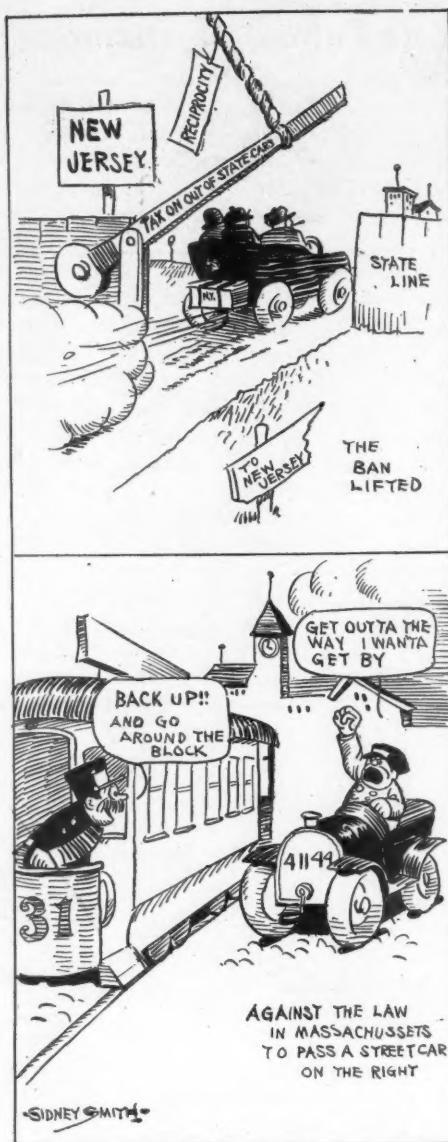
The Glidden tour is abandoned because of a lack of entries.

Kulick in a Ford wins the Algonguin cup in the Chicago Motor Club's annual hill-climb.

Chicago Motor Club promotes sensational reliability around Lake Michigan; with the Moline and Staver winners. Other reliabilities of the year include the St. Paul-Winnipeg, Iowa's Little Glidden, Farm and Ranch tour in Texas and the Buffalo club's event.

Erle in a Benz climbs Gaillon hill in France at the rate of 101.5 miles per hour.

Laurens A. Enos of Buffalo is elected president of the American Automobile Association, succeeding R. P. Hooper.



LEGISLATIVE EVENTS.

SPED events filled up most of the contest program of 1912. There were few liability events, still fewer hill climbs and only one fuel test. The trend seemed to be toward non-competitive affairs, and in this department a signal success was scored in that there were hundreds of so-called sociability tours which lacked competitive features, except that the cars were required to run on a blind schedule, the winners being decided by giving the prizes to the ones coming closest to the unknown time.

One of the other features of the year was the team match, a Chicago idea which has been in vogue in the Windy City for the last 5 years and which has aroused great interest among private owners. This contest is designed to bring out club spirit and the contestants compete more for the glory of the organization they represent than they do for individual honors. There were four of these matches in Chicago last summer, the Chicago Athletic Association twice defeating the Chicago Automobile Club; the Chicago Motor Club defeating the Illinois Athletic Club, while

the Chicago Motor Club trade versus amateur match was abandoned after 1 day's running because of the inclemency of the weather.

There was no Glidden tour in 1912, the first time that classic has been given up. The American Automobile Association decided early in the season to hang up a main trophy to be called the National cup, which was paid for by popular subscription. It also decided to run the tour from Detroit to New Orleans, and the trail was blazed by an electric. Somehow the owners who were expected to support the tour failed to enthuse over the proposition and entries were so scarce that the American Automobile Association was forced to abandon the classic. Charles J. Glidden, donor of the famous cup, which has been the main prize up to this year, was not to be denied, however, and following the abandonment of the big tour he and a few of his friends made the trip from Detroit to New Orleans on the schedule laid out by the A. A. A. pathfinder.

Reliabilities of the Year

There were not more than three or four real reliability runs during the year. The Chicago Motor Club as usual led with a bold scheme, a tour around Lake Michigan, which lead through country that is practically unknown to the motoring world. This proved to be a decided success and evolved as winners two Molines in the roadster class, and the Staver in the touring car division. This was a non-stock run, as were all others during the season. An unusual affair was the reliability run for Texas ranchmen, which brought out a big entry list and stirred up great interest in motoring and road improvement among the farmers of the Lone Star state. Iowa kept its annual little Glidden on the calendar, a 5-day contest, which, however, lacked the usual big entry list. The Twin Cities staged a run from Minneapolis to Winnipeg and back.

There were not so many stunt performances during the season, the chief one being the run of an Alco truck, which was driven from the Atlantic to the Pacific ocean, thus earning the honor of being the first commercial motor vehicle to carry a load of merchandise across the country. Earlier in the year another Alco truck was put through a non-motor stop run at Philadelphia, going 336 hours without a motor stop, covering 922 miles, making 198 trips and 1,284 stops. The Warren-Detroit figured in a non-motor stop run, also breaking the record by traveling 12,409 miles under the supervision of American Automobile Association officials. Another event out of the ordinary was the Frank Kulick in a Ford, who traveled 1 mile on the ice of Lake St. Clair at Detroit in :33 2-5 or an average of 109 miles an hour.

In Europe the feature of the hill climbing season was the performance of Erle in a Benz, who won the Gaillon climb at the rate of 101.5 miles per hour.

Motor Legislative Matters

LEGISLATIVE

New Jersey decides to establish reciprocal registration relations with other states.

New York state attempts to pass a bill requiring makers and dealers to stamp the date of manufacture on all tires sold in the state.

Minnesota's new law goes into effect, requiring registration every 3 years and specifying a reasonable and proper speed limit.

Massachusetts court decides it is illegal for vehicles to pass street cars on the right.

Many cities legislate against the use of the muffler cut-out, insist on universal lights, require an abrupt warning signal and rule against smoking cars.



AMONG GOOD ROADS WORKERS

Because of there being so few legislatures in session in 1912, there was not much doing in a legislative way. The one big feature of the year was the act of the New Jersey legislature, which finally granted reciprocity to other states. It took a long battle to bring this about, and the measure became a law only after the bill had been so amended as to raise the rates of registration 50 per cent, giving New Jersey an added revenue of about \$200,000 a year from motorists. New Jersey for many years held out against this reciprocity clause, but public sentiment finally forced the legislature to capitulate. There are few states in the union now that are not in the reciprocity class. Texas, Tennessee and Maryland are in this category, but it is expected that before the end of another year it will be possible for motorists to go into any state without the necessity of registering, providing they carry the tag of their own state.

Few Decisions Rendered

Also there were few decisions handed down by the courts that had much effect on the legal status of the motorists. Probably the most sensational verdict of the year was the decision of the Massachusetts supreme court last month, which held that although the rules of the road permit of it, it is illegal for any vehicle to pass to the right of a street car, no matter if the street car is moving or if the tracks do not permit the passing to the left.

Another bit of legislation was the attempt made in New York state to compel motor car manufacturers and dealers to stamp the date of manufacture on all tires sold in that state. There is a similar law in Minnesota, but it is a dead letter. The New Yorkers, however, made a vigorous fight and succeeded in killing the bill.

Next year will be a busy one in legislative circles, for nearly every legislature in the country will be in session. Motorists, however, do not anticipate many radical bills. The farmers who now are strongly interested in motorists, wield too much power to permit of any legislature to run him up among the motor laws. It is most likely that the motorists themselves will bring about several needed reforms. There seems to be an insistent demand that all vehicles carry lights at night, and in

Highway Improvement

GOOD ROADS

Carl Fisher and J. A. Allison of Indianapolis ask the motoring interest to subscribe a \$10,000,000 fund for the purpose of buying material with which to construct a trans-continental route.

New York decides on a \$50,000,000 bond issue.

United States census bureau reports that in 1909 this country had a total mileage of 2,199,645 miles of public road of which 190,476 were improved.

American Automobile Association does valiant work in promoting the campaign for federal aid.

Canada and Mexico show commendable activity in the good roads cause.

Many good roads conventions are held during the year.

There was great activity in the ranks of the great army that is working for the betterment of the American highways. While there are no big milestones marking the progress made by the good roads enthusiasts, still it is felt that the cause had been given a big impetus. There were

many good roads conventions held during the year, not only by the motoring interests, but by others as well, while the American Automobile Association kept hammering away at the federal aid proposition until now it looks as if some action will be secured at the convening of the new congress early next year.

In nearly every state in the union good roads organizations were formed. Usually the motorists were the ones to start the agitation, but they found that they had most valuable allies in the shape of farmers, who are thoroughly aroused to the need of improved highways and who are giving the motorists every assistance possible in securing legislation that will bring this about. The recent road congress at Cincinnati brought together a vast army of workers, and while no specific results were obtained as a result of the meeting, it is evident that the army is gaining so many recruits that before the end of another year it will be so powerful that legislatures will have to sit up and take notice.

Activity in General

Iowa, as usual, has kept hammering away for good roads and the season of 1912 has added to the mileage in the Hawkeye state. Colorado has at last realized what a valuable asset it has in its rugged scenery, and the "nation's playground," as it is termed, has come into great prominence within the last few months. In Canada there also is much activity. The authorities are giving the movement all kinds of support and only recently the Canadians succeeded in blazing a trail from Halifax to Vancouver, the first trans-continental trip made in the dominion.

The feature of the year in good roads circles was the proposition sprung by Carl Fisher and J. A. Allison, of Indianapolis, who started a movement to raise a fund of \$10,000,000 with which to buy material to build an official trans-continental route that would be ready for the motor traffic of 1915, when the Panama exposition will be held on the Pacific coast. The Fisher-Allison proposition calls for those in the motor industry to subscribe one-third of 1 per cent of gross profits for 3 years and at last reports the Hoosiers had succeeded in securing pledges for more than \$1,000,000.

New York Turns a Trick

New York has enacted legislation during the year which has helped the good roads cause considerably. In April the assembly passed the Murtaugh bill, which gives \$50,000,000 for road improvements, while the last national election resulted in the approving of a \$50,000,000 bond issue for highways in the Empire state.

During the year the United States census bureau gave out a report which showed that in 1909 the total mileage of all public roads in the United States was 2,199,645 miles, of which 190,476 miles were improved roads.

Stewart-Warner Merger Completed

New Speedometer Company Formed Which Buys Interests of Two Big Concerns and Capitalizes as Virginia Corporation to Carry on Consolidated Business—J. K. Stewart to Head Enterprise—Other Trade Happenings

CHICAGO, Dec. 23—The Stewart-Warner Speedometer Co., a Virginia corporation of \$11,000,000 capital, has just been formed and has purchased the plant and patents of the Stewart & Clark Mfg. Co., Chicago, manufacturer of the Stewart speedometer, and also the plant and patents of the Warner Instrument Co., Beloit, Wis. This new company has \$1,000,000 preferred stock and \$10,000,000 common stock. Although not officially announced, it is understood that J. K. Stewart, president of the Stewart & Clark Mfg. Co., will be president of the new organization. Headquarters will be in Chicago. The deal was closed Saturday.

The physical properties of the Stewart and Warner companies will be continued as at present, that is, the Stewart & Clark Chicago plant and the Warner-Beloit plant will continue manufacturing the same class of speedometers that they have in the past and marketing them under their respective names. There will not be any change in the management of these plants or in the selling organizations.

This purchase of the two companies brings the control of all speedometer patents held by each company under a single control, and so the long-drawn-out litigation on the subject of magnetic speedometers between the two companies is brought to a close. A decision had been looked for from the courts for many months.

The purchase of these two companies in the closing days of the year comes as a climax of a series of unions of this nature in the motor industry, the biggest previous one during the year being the Goodrich-Diamond deal.

New York, N. Y., Dec. 24—A Warner-Stewart official announcement has been made that J. K. Stewart is to be president of the new corporation, but the remainder of the officers have not been selected. C. B. Smith will be general manager.

The suit now pending in the United States district court, southern district of New York, has not been dismissed. Announcement has been made, however, on the part of Stewart & Clark that the principle involved in the patent in question is not important to modern practice and the changes favor a dismissal because of the problematical value of a decision on a point not involved in present manufacture.

STROMBERG SUES ZENITH

Chicago, Dec. 24—Announcement was made here today by the Stromberg Motor Devices Co., maker of Stromberg carbureter, that it has filed suit in the United

States federal court, eastern district of Michigan, Detroit, asking that an injunction be granted prohibiting the Zenith Carbureter Co., Detroit, maker of the Zenith carbureter, from manufacturing carbureters claimed to be infringement of two patents held and owned by the Stromberg company.

One is the Ahara patent granted in 1901, which contains claims on a carbureter without moving parts; and the other is the Richard patent which covers a U-shaped tube in a carbureter in certain relation to the gasoline supply, one end of the tube extending into the mixing chamber and the other exposed to the atmosphere, combined with other features essential in modern carbureters.

The Richard patent was granted in 1905. The Stromberg company claims that the Ahara patent describes a carbureter which has the same mode of operation as used in the Zenith, giving proper mixtures of air and gasoline by automatic control, and without the use of moving parts.

V. R. Heftler of the Zenith company, interviewed in Detroit, states that the suit will be fought and that there is no ground for action. The Detroit attorneys for the Zenith company will be William M. Swan of the firm of Keena, Lightner, Oxtoby & Oxtoby. The services of the prominent patent attorneys, Bigwell & Barnes of Pittsburgh, who have attained prominence through their handling of patent litigation for the United States Steel Corporation, also have been secured by the Zenith company, which has not yet made any plans for its line of defense, as it is very difficult to determine the exact status of the matter until the taking of the first testimony, the bill of complaint having the usual vagueness, it is claimed.

FORD MAKES ANNUAL STATEMENT

Detroit, Mich., Dec. 23—According to the balance sheet for the fiscal year ending September 30, just issued by James Couzens, secretary and treasurer of the Ford Motor Co., the assets of the company at the end of the year amounted to \$20,815,785.63; of which \$6,400,100.66 represented cash on hand and in banks. Other items included in the assets were:

Michigan municipal tax exempt bonds at cost, \$1,075,051.48; accounts receivable, \$230,912.17; merchandise inventories at cost, \$6,629,533.83; other investments, \$7,772.04; prepaid expenses, \$44,591.07; real estate, \$820,636.97; buildings and building fixtures, \$2,596,115.61; factory equipment, \$371,110.90; office furniture and fixtures, \$58,059.39; power plant, \$301,166.13; machinery, \$1,542,800.89; tools, \$566,510.17; patterns, \$66,884.06; machinery, tools and equipment at branches, \$52,746.30; patents, \$51,793.96.

Included in the liabilities were: Accounts

payable, \$2,261,026.63; accrued pay rolls, \$149,166.45; accrued salaries, \$12,327.45; accrued expenses, \$178,766.10; contract rebates, \$58,350; reserve for refunds to take care of reduction in price, \$75,000; reserve for employees' bonus, \$242,033.80; reserve for bad debts, \$3,655.04; reserve for depreciation of fixed assets, \$742,626.89; reserve for depreciation of patents, \$51,793.96; reserve for fire insurance premiums, \$11,900.40; reserve for unearned profits, branches, \$284,043.34; capital stock, \$2,000,000; surplus, \$14,745,095.57; total, \$20,815,785.63.

PITTSFIELD FORMS ALLIANCE

Dalton, Mass., Dec. 23—The reported rumors of an alliance between the Western Electric Co. and the Pittsfield Spark Coil Co. have been officially confirmed by both parties concerned. Under the arrangement between the two companies the entire line of Pittsfield products, including magnetos, spark coils, spark plugs, timers and switches are now to be marketed exclusively by the Western Electric Co., under the name of Western Electric-Pittsfield. For a while the Pittsfield company will continue to sell some magnetos direct. It is understood that beginning January 1 a sales campaign will be launched covering the entire line of Western Electric-Pittsfield devices, which has been materially extended to take care of the allied business. The sales efforts of the Western Electric Co. will be directed largely towards manufacturers and supply houses. Ample stocks will be carried at each of the twenty-eight Western Electric distributing houses, located at shipping centers throughout the country.

NEW TRUCK COMPANY ORGANIZED

New York, Dec. 23—The American Motor Traffic Co., incorporated under the laws of South Dakota, was formally organized in Washington, D. C., on December 18, where it will occupy the fourth floor of the new Citizens' Bank building at 1421 G street, N. W. The directors of the company are: E. S. Alvord, president; E. J. MacFarren, first vice-president and acting manager; W. J. Moore, second vice-president; A. L. Kley, secretary.

The company will specialize in heavy duty commercial motor vehicles of the pivoted spindle, multiwheel drive and steer type, with flexible load suspension and balance, and also in liquid fuel combustion engines and vehicle accessories. Many other items of improvement in vehicle construction are said to be controlled by the company under various patents granted to MacFarren, Thomas and others and further protected by special trade marks.

CHALMERS HOLDS GINGER NIGHT

Detroit, Mich., Dec. 21—Gathering together salesman, traveling men, district managers and officers in 300 cities and towns throughout the United States the

Chalmers Motor Co. Monday night celebrated "ginger night." At 7:30 o'clock or earlier in all these places simultaneous meetings of the Chalmers dealers and their organizations were held.

At the same time a banquet and meeting of heads of departments and other officials of the factory organization was held in Detroit. Throughout the evening the central meeting in Detroit was in telegraphic touch with the other ginger meetings throughout the country.

"Ginger night" was conceived and planned by the Chalmers sales department for the purpose of stimulating the dealers and their salesmen everywhere to even greater enthusiasm in the sale of the Chalmers cars. It was decided that by selecting one evening and arranging to have all dealers and their men concentrating their thoughts on sales promotion at that particular time the greatest enthusiasm or ginger could be instilled into the men in the field.

Announcements of the plan were sent out long in advance. Letters from Mr. Chalmers, bulletins and notices of various kinds served to interest the dealers in the plan and everywhere Chalmers dinners were given and meetings held. Regular programs of discussion were arranged, in which every phase of motor car selling problems was discussed.

Reports of these meetings telegraphed in to the factory meeting indicated the greatest enthusiasm everywhere. At the central meeting in Detroit all the talks made by the officials and department heads of the Chalmers company were along the lines of ginger. Various definitions of ginger and ginger night were given.

DE TAMBLES AFFAIRS DISCUSSED

Indianapolis, Ind., Dec. 23—Creditors of the De Tambles Motors Co. met in Anderson, Ind., on December 18 with H. C. Sheridan, referee in bankruptcy. An offer had previously been made to settle at 10 cents on the dollar, but it was thought best to examine the bankrupt before taking final action on the offer. An appraisement shows the assets are \$145,000 while the liabilities are about \$233,000, which includes \$133,000 in bonded indebtedness. There is about \$100,000 in open accounts. A settlement has not been agreed on thus far.

RECEIVER FOR MATHESON

New York, Dec. 23—Following a meeting of stockholders and creditors of the Matheson Automobile Co. in Wilkes-Barre, Pa., at which it was petitioned that a receiver be appointed for a short term, Judge Witmer, sitting at Wilkes-Barre, Pa., and Judge Holt at New York, named William C. Shepherd, president of the Matheson Automobile Co., as receiver in equity. The reason given for the receivership is that the company is unable to meet its maturing obligations. Liabilities are estimated at about \$600,000 and assets as

shown by the company's books, about \$1,000,000.

L. L. Lewis, counsel for the reorganization committee of the Matheson Automobile Co., and J. N. Rosenberg of Rosenberg & Lewis, counsel for the Bosch Magneto Co., and the creditors' protective committee, have issued the following statement:

A plan of financial readjustment was prepared about a month ago which has met with the approval of about 80 per cent of stockholders and 60 per cent of creditors. Pending completion of the plans of reorganization it was found advisable to apply for a short term receivership. Co-operating with Mr. Shepherd, president and receiver for the company is a creditors' committee consisting of G. Jahn, treasurer of the Bosch Magneto Co.; H. P. Jones, president of Phineas Jones & Co., and E. S. Fretz, president of the Light and Foundry Co. The outstanding capital stock is about \$2,500,000.

The nominal assets of the company are estimated at \$1,000,000 and the liabilities are placed at \$600,000. It has been announced that the receivership is to be very brief, extending over a period of only about 3 weeks. It is friendly in its inception and was intended, according to the announcement, to stave off insistent creditors until the plans for refinancing the company are perfected. The company made sharp retrenchments at the time of the reorganization and has done a good business since then. According to statements from the company, its basic condition is good and the legal steps resulted from a temporary lack of capital coming at the height of the non-productive season.

LION SALE POSTPONED

Detroit, Mich., Dec. 23—As the highest bid for the property of the Lion Motor Car Co., of Adrian, Mich., was too low, Referee in Bankruptcy Lee Joslyn has postponed the sale to December 24. The property was appraised at \$33,401.73 and the highest amount offered at the sale at Adrian was \$7,000. Referee Joslyn thereupon postponed the sale. After the sale the creditors will elect a trustee.

UTAH TACKLES USED CAR PROBLEM

Salt Lake, Utah, Dec. 21—The Utah Automobile Trades Association is the name of a new association which has just been organized in this state to protect dealers from some of the evils which have grown up in the trade. The new organization has opened an office at 251 State street, in this city, with a manager in charge to take care of its business. The question of credits will be handled through a credit bureau within constant telephone communication with all its members. This will be of special benefit to the garages who are at present victims of the man who owns a motor car and depends upon his "front" to get his repairs, gasoline and oil on credit.

The second-hand car situation will be handled by dealers in this manner: Whenever an offer is made on a second-hand car by any member of the association, this offer is immediately telephoned to the central office of the association. Such information is confidential, but in case the party wishing to dispose of

his car goes to another dealer such dealer can find out by telephone just how much has been offered on this particular car, although the name of his competitor is not given. In this manner dealers are at all times protected from persons going around and getting dealers to bid against each other by inflating the price which he has been offered. The cut rate and consumers' league schemes, so much seen these days, will also be handled by cutting off the source of supply.

The new association is composed of all the larger concerns in the state and nearly all of the smaller. It will not attempt to regulate the greater evils of the trade, such as price-cutting, at first, but hopes to later on.

GRABOWSKY SALE POSTPONED

Detroit, Mich., Dec. 23—Referee in Bankruptcy Lee Joslyn has postponed the sale of the property of the Grabowsky Power Wagon Co., adjudicated bankrupt about a month ago, until Thursday. When sealed bids were opened at the office of the referee today only two offers were received. One bid was from the Joy Realty Co. of Detroit, which bid \$137,300 for the real estate, machinery and equipment, which were appraised at about \$188,600.

The other offer was from Wintermitz & Co. of Chicago, which offered to take the property, with the exception of the real estate, and sell it for a commission of 12½ per cent, guaranteeing to net \$55,000. The total, under the two bids, would be less than \$175,000. It is believed, and Referee Joslyn is confident, at least \$200,000 can be realized, which would give the creditors 50 cents on the dollar.

IOWA ADOPTS ROAD PROGRAM

Des Moines, Ia., Dec. 23—Four hundred delegates, representing every county in Iowa, adopted the best organized good roads program ever attempted in the state this week at the annual meeting of the Iowa Good Roads Association. As adapted by the convention the program will ask the coming state legislature for a 1-mill tax levy, a road bond issue and permanent state highway commission and the compulsory dragging of dirt roads.

Permanent roads carried the convention by storm and there was little dissension between delegates as to the need of centralizing good roads campaigns on the permanent road feature. Governor Carroll, who was kept from the convention by sickness, sent a report by President Lafe Young that he would, in his annual message to the Iowa legislature, ask for state aid for permanent roads.

SERGEANT CHANGES

Indianapolis, Ind., Dec. 23—On January 1, Charles E. Sargeant of Anderson, Ind., who has been mechanical engineer for the Remy Electric Co. and American Rotary Valve Co., of that city, will become chief engineer for the Lyons-Atlas company of Indiana.

MOTOR AGE

Published Weekly by
THE CLASS JOURNAL COMPANY
 910 SOUTH MICHIGAN AVENUE CHICAGO

Entered as Second-Class Matter September 19, 1899, at the Postoffice at Chicago, Illinois, under Act of March 3, 1879

SUBSCRIPTION RATES
 United States and Mexico \$3.00 per Year
 Other Countries including Canada \$5.00

1912

*Ring out the old
 Ring in the new*

AS December gives way to January and New Year's resolutions become at least a portion of the program which marks the ending of one year and the beginning of another, every motorist scans the pages of the last 12 months and consciously or unconsciously balances his accounts—financial and mental.

THIS retrospect largely evolves the barometric reading for 1913. The shortcomings, the errors, the disappointments, the delays and the discomforts of the past are the steps in the staircase which the ardent motorist mounts to circle the horizon of the New Year. He looks for solutions, cheaper car operation, cheaper parts, reduction of tire troubles, more rational driving, closer investigation of repairs, keener following of garaging, more comprehensive outline of his summer touring, and a more consistent use of the car so as to give a greater sum total of pleasure and usefulness than during the year just departing. In a word, he aims at a more complete existence during the new year than during the past one.

POST mortems are never pleasant; a glance over the unfolding future is more pleasant, perhaps more profitable. But you can only see the future through the eyes of the past; the present is but a transition, the dividing line between tomorrow and yesterday, where moving pictures flitter over the screen, seen but a moment and then hurried into the inexorable past.

NINETEEN Hundred and Twelve has had its lessons. Some have been to the car owner, some to the car manufacturer. Many have been stern lessons; nature's punishments besides being certain are painful, creating lasting impressions. These lessons record the progress of the year.

FIRST, the manufacturer: 1912 has been elimination year; more concerns have trod the thorny path to the courts than in any previous year. Some made the trip, never to return; others came back rejuvenated with new shackles, new blood and new principles. With all it has been inadequate business management resulting in wrecking internal dissensions, reduced output and shattered credit. Nineteen hundred and twelve has been a year in

*Ring out the false
 Ring in the true*

which the measure of the factory executives has been taken as never before. Many a high pedestal has fallen and its statue of clay crumbled to mother earth. Names high on the roster a year ago are now missing; the checker board is altered, crowned heads are missing, pawns are changed; but amid all the vicissitudes the stalwarts remain unaltered, unmoved and begin the new year stronger bulwarks for this giant industry and beacons in the world of production and finance.

NINETEEN Hundred and Twelve has been a sane year—elimination of worthless timber is always indicative of progress, of permanent progress and of consolidation. True, many companies have been discontinued because financial interests grew tired of replenishing a depleted treasury; but those remaining are stronger—stronger because of that strength which comes from judicious administration, efficient executives, reduced cost of production and more conservative marketing of the product.

NINETEEN Hundred and Twelve has been a sane year in regard to the commercial vehicle. Some makers have centered the majority of their effort on it; they have brought out an honest vehicle and are marketing it in conformity with twentieth century principles. Others who tried to modify passenger cars into commercial vehicles have seen the error of their ways and have frankly announced that for next year they will not build merchandising vehicles, but confine their effort to passenger types. This shows keen business insight.

PRODUCTION cost has been reduced by the elimination of too many models and centralizing on one or two and increasing the number of each. Large holding organizations have eliminated entire factories and for next year will concentrate on a few factories with big production. This is commendable business acumen. It improves the annual statement and increases the prestige of the industry in the eyes of the other big industries of the century.

FOR 1913: May the manufacturer build for the buyer an honest, money-worth car; may the buyer operate for the good of both.

Sunbeam Entry for Indianapolis Meet

PARIS, Dec. 14—England's greatest attraction, the six-cylinder Sunbeam car which on September 9 established world's speed records from 4 to 12 hours, will almost certainly be seen in the Indianapolis 500-mile race on May 30, with a crack French driver at the wheel.

Owing to press of business and the fact that it is entered for the French grand prix to be run at the end of June, it is impossible for the Sunbeam company to officially take part in the American classic. Arrangements have just been completed, however, by which Albert Guyot, a leading French driver, will take over the record-breaking car and run it in the Indianapolis

Guyot to Drive English Six in Memorial Day 500-Mile Race

event. So far he is the only European driver who has declared his intention of making the trip to America.

The Sunbeam racer, which is one of the best examples of European high-efficiency motors, has six cylinders of 90 by 160 millimeters—3.54 by 6.29 inches—bore and stroke. Darius Resta, driving this car at Brooklands on September 9, covered a distance of 50 miles in 32 minutes 16½ seconds, standing start, this being an average

of 92.96 miles an hour. The previous record was held by a much larger car with an average speed of 91.32 miles an hour.

Albert Guyot, who will drive the Sunbeam record-breaker, is one of the old school of French race drivers. In 1908 he won the light-car class of the French grand prix on a Delange, and in the following year finished fourth in the 3-liter race at Boulogne, also in a Delage. Albert Guyot is an aeroplane pilot, holding the license of the Aero Club of France, and has figured prominently in motor boat races at Monaco.

Necessary work to get more entries for Indianapolis is continuing and it is hoped and believed it will produce results.

MEETINGS

January 14-16—Motor and Accessory Manufacturers' meetings at New York.

January 14-16—Society of Automobile Engineers' meetings at New York.

SHOWS

December 7-22—Paris salon.

December 16-21—Seattle, Wash.

January 2-10—Importers' Salon, Hotel Astor, New York.

January 4-11—Cleveland.

January 4-11—Montreal.

January 11-18—New York pleasure car show; Automobile Board of Trade; Madison Square Garden and Grand Central Palace.

January 11-18—Milwaukee, Wis.

January 11-22—Brussels, Belgium.

January 20-25—New York truck show; Automobile Board of Trade; Grand Central Palace and Madison Square Garden.

January 18-25—Philadelphia pleasure car show.

January 21-26—Toledo show.

January 25-February 1—St. Johns, N. B.

January 25-February 1—Providence, R. I.

January 25-February 1—Montreal, Canada.

Coming Motor Events

January 27-February 1—Rochester, N. Y.

January 27-February 1—Ottawa, Ont.

January 27-February 1—Scranton, Pa.

January 27-February 1—Detroit.

January 27-February 1—Buffalo, N. Y.

January 27-February 1—Philadelphia truck show.

February 1-8—Chicago pleasure car show; National Association Automobile Manufacturers.

February 3-8—Washington, D. C.

February 10-15—Chicago truck show.

February 8-15—Hartford, Conn.

February 10-15—Minneapolis.

February 12-15—Geneva, N. Y.

February 15-22—Newark, N. J.

February 15-22—Albany, N. Y.

February 16-23—Richmond, Va.

February 17-22—Kansas City pleasure car show.

February 18-21—Grand Forks, N. D.

February 19-23—Topeka, Kans.

February 20-22—Canandaigua, N. Y.

February 24-March 1—St. Louis, Mo.

February 24-March 1—Memphis, Tenn.

February 24-March 1—Cincinnati, O.

February 24-March 1—Omaha, Neb.

February 24-27—Kansas City truck show.

February 26-March 1—Fort Dodge, Ia.

February 26-March 1—Glen Falls, N. Y.

March 3-8—Sioux City, Ia.

March 1-8—Pittsburgh.

March 3-9—Des Moines, Ia.

March 8-15—Boston pleasure car show.

March 11-15—Des Moines truck show.

March 12-15—Ogdensburg, N. Y.

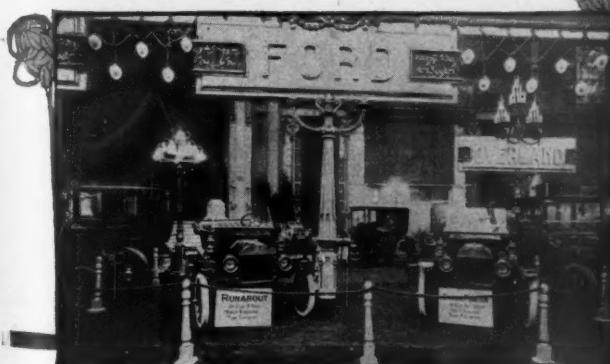
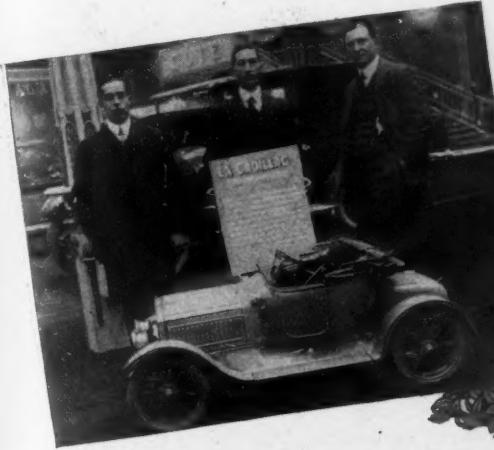
March 18-22—Syracuse, N. Y.

March 18-22—Truck show, Buffalo, N. Y.

March 19-26—Boston truck show.

March 20-24—New Orleans, La.

March 24-29—Indianapolis.



SOME AMERICAN MAKERS EXHIBITING IN PARIS SALON

European Trend in Motor Car Engines

By W. F. Bradley

PARIS, Dec. 14—European design, as represented at the Paris show, is decidedly toward monoblock casting of four and even six cylinders. There are only two motors with separately-cast cylinders in the whole show; one of these is French of such a special design that block casting is almost impossible, and the other is an English motor of the T type.

For six-cylinder motors two groups of three is in the majority, this being the method adopted by Delaunay-Belleville and Mors. There are a larger number, however, who prefer a block casting for such a big group as six-cylinders of fairly big bore. Brasier has adopted it for his six-cylinder measuring 3.5 by 5.5 inches bore and stroke. Delage has the same method for a six of 2.5 by 5.1 inches bore and stroke; La Buire adopts it for a motor of the same size as the Brasier; Pilain has a monoblock of 2.5 by 4.7 inches bore and stroke.

Some Monoblock Advocates

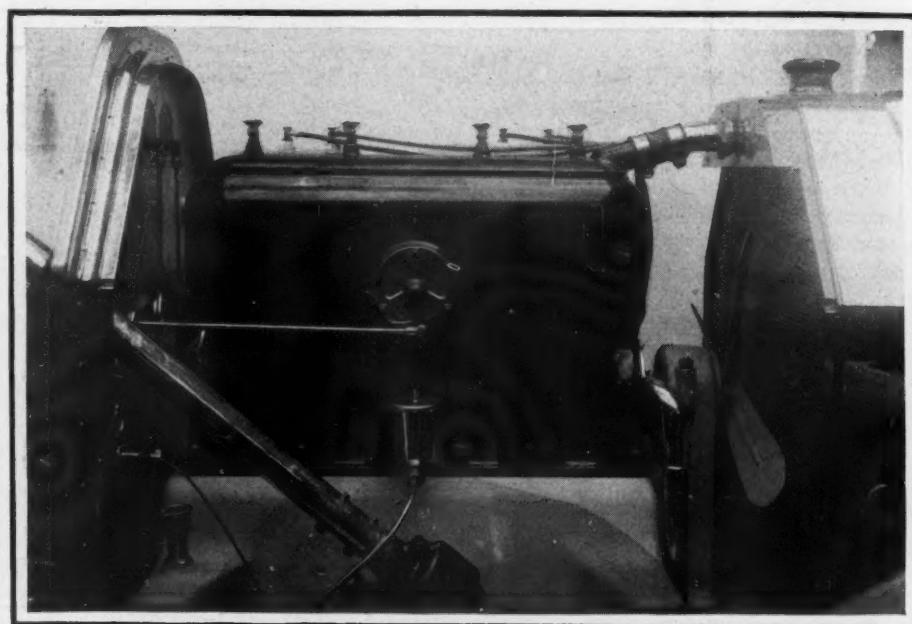
In the four-cylinder section some of the biggest monoblock castings are Nazzaro and Bianchi, 3.9 by 5.5 inches; Turcat-Mery, 4.3 by 6.2 inches; Rochet-Schneider, 4 by 5.5 inches; Lancia 3.9 by 5.1 inches; Aquila of 3.1 by 5.1. This firm has a six-cylinder of equal dimensions cast in one block. Aquila, an Italian firm, and the baby Peugeot, are the only ones in the show having cylinders and upper half of crankcase in a single casting.

The construction in the case of the Italian is most interesting, the cylinder casting comprising intake and exhaust manifolds, the magneto platform and the body of the water pump. There is a single camshaft with superimposed valves, the intakes being mounted vertically in the head and operated by rocker arms. The spark plugs also are in the head, the whole being covered by a light aluminum plate, so this motor is undoubtedly the most complete example of a block to be found in the show.

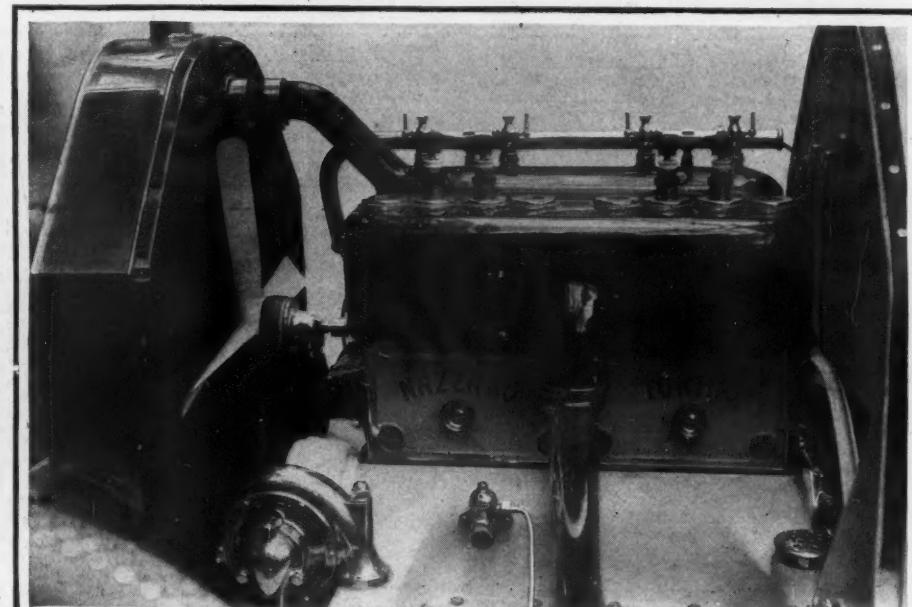
Exceptional Construction

On the right-hand side are the priming cocks and the carburetor, with a couple of large inspection plates for the connecting rod ends; on the opposite side is the magneto with the wires going through a hole in the cover on the top of the motor to the plugs. The base also is distinctive, for it comprises the complete underpan, the cradle around the flywheel and the lower half of the gearbox. This base is mounted directly on the frame members, adding to the rigidity of the entire construction. This design is undoubtedly exceptional; indeed the only other nearly approaching it is the Bianchi which has the crankcase brought up so as to partially inclose the valve stems.

Block Castings Have the Call with the Foreigners—Only Two Separately-Cast Cylinder Designs in Fours Exhibited in the Grand Palais—Sixes Use Groups of Threes



MONOBLOCK TYPE OF MOTOR USED BY SPA



NAZZARO'S IDEA OF A MONOBLOCK MOTOR

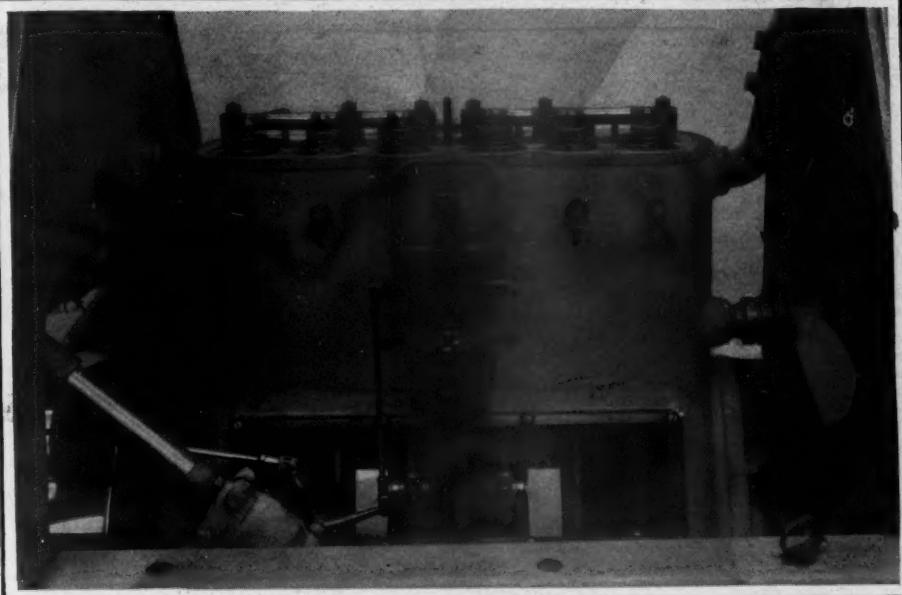
The Italian makers are very strong partisans of integral intake and exhaust manifolds. Examples are Bianchi, Nazzaro, Spa, and Fiat. Isotta-Fraschini keeps the exhaust manifold separate. On the French cars the tendency is to make the gas passages an integral part of the cylinder casting, the carburetor being connected up with a very short length of pipe, and in dealing with the exhaust a few prefer to bolt it on separately.

There is a good example of this in the

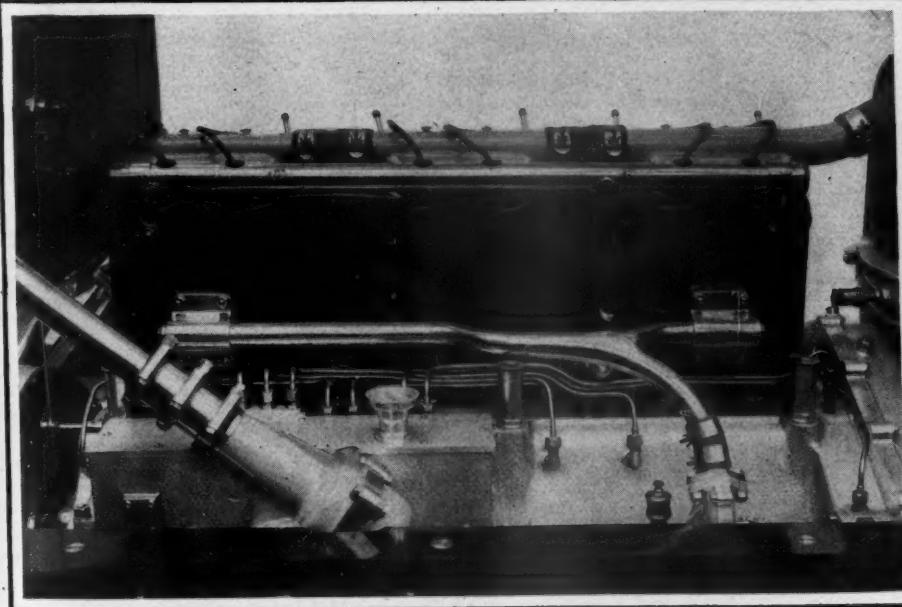
big Rochet-Schneider, the carburetor being bolted right up to the cylinder walls without any piping whatever. The same is found on the big Turcat-Mery. On the Delage six-cylinder the intake and exhaust manifolds are combined, the carburetor being on the left hand side and connected up to the manifold just above the valve stems by a short length of piping having a circular section at its base and gradually enlarging to an oval section at the point where it is attached to the cast-

As Demonstrated at the Paris Solon

Valves on One Side Seen on About 75 Per Cent of Cars—
Big Increase in Use of Silent Chain for Driving Cam and
Magneto Shafts—Refinements in Small Details



AQUILA WITH CYLINDERS AND CRANKCASE IN SINGLE CASTING



BRASIER MONOBLOCK SIX-CYLINDER MOTOR

ing. Pilain with a small six having valves on one side, also makes intake and exhaust manifolds an integral part of the casting.

It is worth noting that Charron, one of the most fashionable of the French makes has adopted this type of casting on a new 3.1 by 5.9 inch motor. A former model had only 4.7-inch stroke. In this case the carburetor is on the right-hand side, the gas passages going through to the intake valve ports on opposite side.

Peugeot has a similar arrangement, the Claudel carburetor being bolted right up to the casting, and the exhaust manifold being integral and water cooled on the opposite sides. Gregoire and Panhard, on their new small models, have both adopted an independent ribbed exhaust manifold, forming a straight length in front of the ports and having the exhaust pipe of the motor bolted up to its extremity.

The integral exhaust manifold with

water circulation around it undoubtedly is increasing in popularity, for the whole tendency is to make the motor as clean-cut and as free from external piping as possible. There are some remarkably fine examples of this, without going to the extreme of castings of a difficult and complicated nature.

Valves on one side, or L-type motor, comprises about 75 per cent of the whole. Of the remainder about 15 per cent have valves on opposite sides and 10 per cent superimposed valves. Those still using valves on opposite sides are Hispano-Suiza, Pilain for a very compact six-cylinder motor, and Zedel.

Superimposed Valves

Superimposed valves, with a single cam-shaft, are used by Sava, D. S. P. L., Aquila, and Motobloc. This is a type of construction more in favor with the Belgians than with the French. It undoubtedly makes possible bigger valve areas, and as all the mechanism is inclosed and the rockers can be easily adjusted, the objections against it are not very solid. A few of the French makers using this system have experienced spark plug troubles, but in these cases the plugs were mounted horizontally in the cylinder on the side opposite to the valves, in which position they were most likely to receive whatever oil got past the piston rings.

Valves inclined in the head have practically gone out of use except for racing or semi-racing type motors. The only exception of any importance is the Majola which is a small motor with valves inclined at 45 degrees, operated from rocker arms and a single cam-shaft, the overhead mechanism being lubricated under pressure, a constant level of oil maintained in the cam-shaft housing, and the excess returned to the base-chamber.

Pipe Makes a Change

Pipe, for a long time a leader in the overhead valve group has this year made the change of valves to one side on a motor of 3.9 by 7 inches bore and stroke. This change is significant, for the firm is one having paid the greatest importance to motor efficiency and having stuck to the overhead type because of its inherent advantages of hemispheric combustion chamber and big valve diameters rendered possible.

There is a peculiar valve arrangement on the Zebre car. The motor is of the L-type, with the valves in two rows, the exhausts on the outside and the intakes behind them, the single cam-shaft operating the two rows of pushrods by means of internal rockers. The motor is a very small one, its bore and stroke being 1.9 by 3.9, and its intake manifold is cast with the cylinders, with the carburetor at the rear of the group.

The tremendous increase in the use of

the silent chain for driving the cam and magneto shafts has been mentioned in previous articles to Motor Age. The Italian makers appear to be the only group adhering to meshing pinions, and among the French firms the only important exceptions are Delaunay-Belleville, Renault, and Lorraine-Dietrich. One of the most recent to take up the chain is Charron, for a new 3.1 by 5.9-inch motor; it has been decided, however, that the use of the chain will be extended to all other models.

Means of Fitting Chains

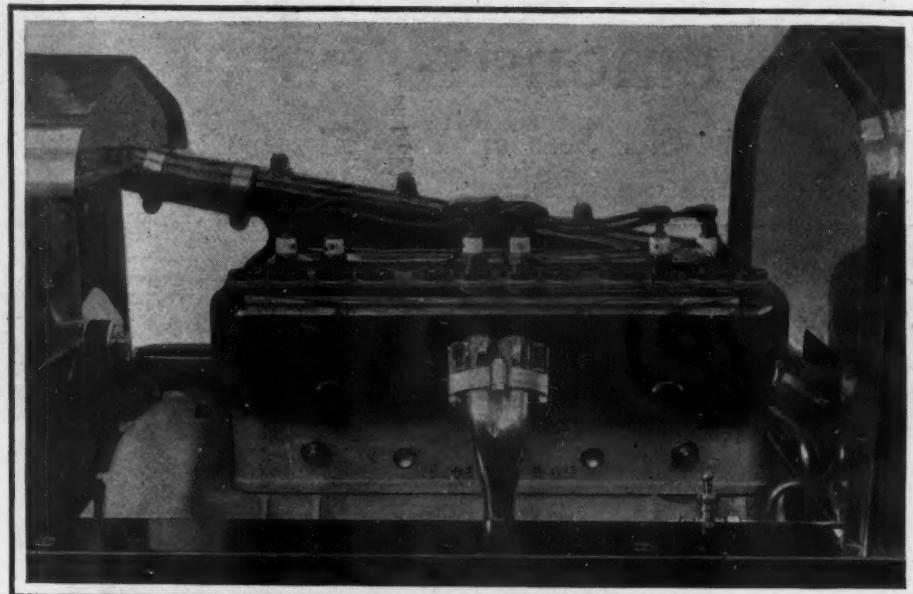
A few of the methods of using the chain are peculiar. Pilain, for instance, has a very compact T-type six-cylinder motor, in which one chain goes round exhaust camshaft, and ventilator fan pinions; the second goes round crankshaft, intake camshaft and magneto shaft. Cottin-Desgouttes, with an L-type motor, interposes an idler pinion between magneto and camshafts, this idler being mounted on an eccentric to take up slack.

Delage makes use of two distinct chains—crankshaft to camshaft and crankshaft to magnetoshaft, the magneto being on opposite side of motor to valves. Fixed centers are used. Unic has two distinct chains from crankshaft to camshaft and camshaft to magneto shaft, the latter chain having an idler mounted on a swinging arm for automatically taking up slack. There are a large number of cases in which a single chain is employed where magneto and water pump are driven by a transverse shaft. An example of this is the new Pipe motor.

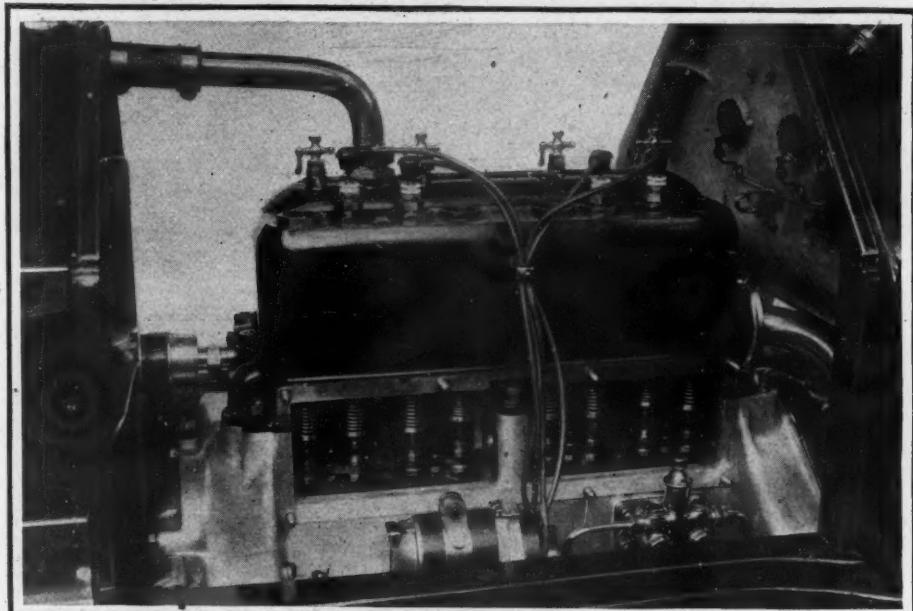
Simplifying Motor Upkeep

Considerable refinements have been made in those small features which tend to simplify the upkeep of a motor. Obviously the first step in this direction is the abolition of external piping, making the motor a clean-cut block which can easily be wiped over. There are other considerations, however, chief among them being accessibility of parts. On the Turcat-Mery the crankcase breathers—two in number for the big monoblock motor—are on the cylinder walls, the breather pipe passing down between first and second and third and fourth cylinders into the crankchamber. This abolishes the use of piping, there being just a couple of fine wire gauze screens on the cylinder walls for the escape of the crankcase gases. Just above one of these screens is a pocket with a lid over it, allowing oil to be poured into the sump. This filler being very near the top of the cylinder casting is most conveniently situated.

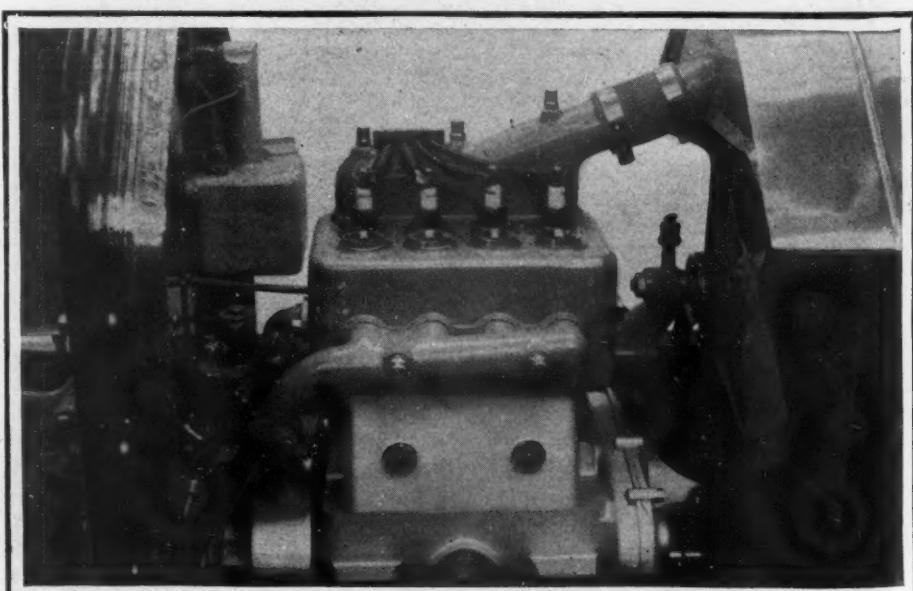
On the carbureter side of the motor the Turcat-Mery has quick detachable covers for examining the connecting rod ends. The body of the carbureter is low and has a metal casing round it. From this casing there is a central outlet, thus an overflow of gasoline is got rid of immediately. Bayard-Clement, with a new motor having the radiator at the rear, has mounted



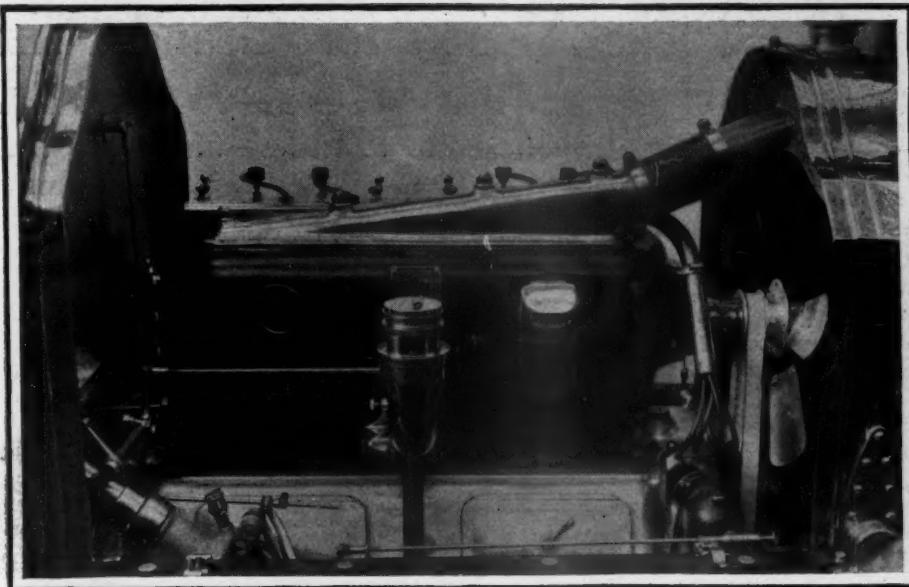
SIX-CYLINDER MONOBLOCK MOTOR ON THE DELAGE



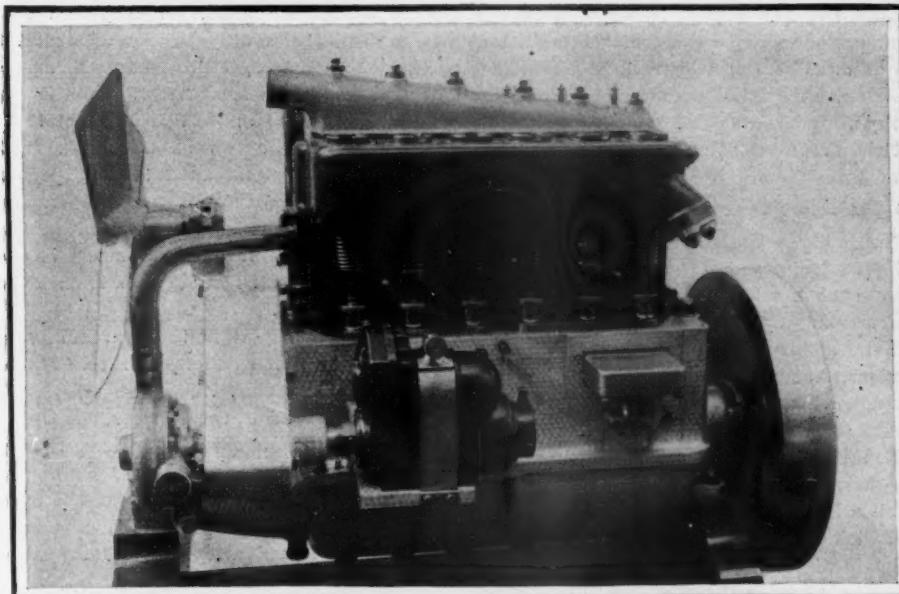
BIANCHI WITH OIL-TIGHT CHAMBER FOR VALVE SPRINGS



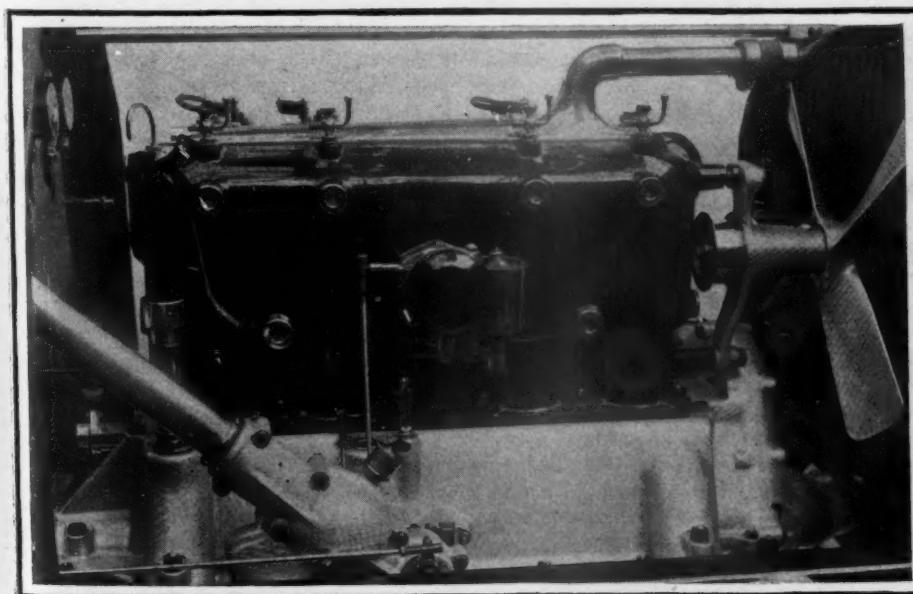
ZEBRE WITH VALVES IN TWO ROWS AND SINGLE CAMSHAFT



NOTE CRANKCASE BREATHERS AND OIL FILLER ON TURCAT



PILAIN SIX MOTOR WITH VALVES ON OPPOSITE SIDES



MOTOR THAT IS BEING USED BY ROCHET-SCHENIDER

an air pump for tire inflation at the extreme front, the pump being driven by means of a pinion on the extremity of the camshaft with which a pinion on the pump shaft is brought into engagement as required. Both pinions are inclosed and a small lever on the side of the housing allows the gears to be brought into engagement. The shaft for the starting crank is encased, this casing being bolted up to the main portion of the crankcase. On the front end of the crankshaft is a pulley for driving an electric lighting dynamo by belt connection. The pulley is within the added housing, which is cut away just sufficiently to allow of the passage of the belt.

Peugeot Abolishes Mudpan

Peugeot has abolished the use of the mudpan under the motor in order to allow air to play round the ribbed base-chamber. The space between the sub-frame and the main frame member is covered by sheet metal plates, these being secured by spring clips on the inside instead of the outside. Chenard-Walcker has also an oil base chamber deeply ribbed to assist in cooling, but in this case a complete mudpan is fitted with an opening at the front only equal to the depth of the base chamber fins. This keeps the underside of the motor clean and allows a current of air to play around the base-chamber.

In nearly all cases mudpans are being made quick detachable. A common practice is to put in permanent plates between sub-frame and main frame members, carrying the exhaust pipe and the drag link of the steering gear through them, and attaching the central part by spring clips.

Provision always is made for emptying the crankchamber of oil by means of a cock, the handle of which is brought up to the height of the frame member. There are very few cars in which it is necessary to get underneath in order to drain off the supply of oil. On all the more expensive cars a three-way cock is used, with positions for emptying, showing level, and closed. On the Benz the overflow and the level indicating pipes have their ends turned upwards and a metal guard mounted over them, with a clearance of about $\frac{1}{8}$ -inch between pipe and guard, or just sufficient to prevent dirt getting in and yet allow oil to flow.

Crankcase Sumps Low

The quantity of oil in actual circulation has been considerably increased until crankcase sumps are now so low that there is comparatively little clearance on some of the cars. As an example, Berliet has a 25-horsepower motor with $1\frac{1}{4}$ gallons of oil in the sump; this is quite an average amount. To obtain a big quantity of oil in circulation and at the same time keep the sump down to reasonable dimensions, Delage has a reserve supply of nearly a gallon in a dashboard tank. The switch

is combined with a tap shutting off this supply of oil when the ignition is switched off. When the motor is running the pump delivers oil first to the dashboard tank, from which it is driven under pressure to the bearings.

These two supplies, sump and dashboard, give a total quantity of about 2 gallons of oil. It never is necessary to pour oil into the crankchamber. When renewing, the combined switch and oil tap is turned until the correct quantity of oil has flown into the sump, as indicated by the level tap; the dashboard tank is then filled. Berliet has a very neat method of indicating the quantity of oil in the sump. The usual type of float is fitted in the crankchamber, but instead of its stem being brought straight through the crankchamber, as is usual, it is brought up to operate in front of a graduated scale on the dashboard.

Forced Feed Lubrication

Forced feed lubrication is a strong feature of the cars at the Paris salon. There are two main methods of carrying this system out, and they are about equally represented. In the first the oil is delivered to the main bearings, to the connecting rod ends, and some times to the wrist pins, under pressure. In the second case only the main bearings are fed under pressure with troughs for the connecting rod ends. The two methods are about equally employed.

There is not much variety in the amount of pressure employed in the oiling systems. On an average it stands about 20 pounds to the square inch and varies from 7 or 8 pounds to as high as 50 to 60 pounds. There is a tendency to oil the camshaft bearings under pressure, as is done by Unic, or to provide a separate housing for the camshaft in which a constant level of oil is maintained, as on the Chenard-Walcker cars. In a few cases provision is made for oiling the valve springs and guides. This is done on all the Unic models for the coming season, there being an oil hole from the crankchamber to the valve stem chamber, a raised front edge to this chamber to prevent oil overflowing, and an oil tight valve stem cover.

Bianchi's Methods

Bianchi adopts a similar method, the crankchamber being built up around the base of the cylinders, which are a block casting on all types, and a clear opening left from the crankchamber into the valve stem chamber. The valve stem cover is held down on a series of bolts, there being a paper gasket between the cover and its seat. With this design the valve springs are working under the same protected conditions as any other part of the internal mechanism of the motor. On the newest model Panhard provision is also made for a certain quantity of oil to escape from the crankchamber into the valve stem chamber.

France Picks Amiens for Grand Prix

Road Racing Classic to be Run Over Course 80 Miles North of Paris—Circuit Shortened to 19 Miles—Small-Car Event Postponed Until Middle of September

PARIS, Dec. 14—Next year's French grand prix road race will be run on a 19-mile course 2 miles to the east of Amiens and 80 miles north of Paris. An official announcement regarding this course will be made next week, but from reliable inside information it is possible to definitely announce that the Amiens course will meet with the entire approval of the racing board of the French club.

Amiens, a flourishing town of more than 90,000 inhabitants, a large proportion of which are interested in the cloth and woolen trade, is on the main railroad line from Paris to Calais, with a railroad station on the main line within a couple of hundred yards of the point where the grandstands will be erected. It is within 80 minutes of Paris by rail, 3½ hours of London, and within easy reach of the Belgian frontier. The town can provide all the accommodation necessary for a big crowd of spectators.

To Use Short Course

The 19-mile course is the shortest ever adopted for a speed contest in France, and is of such a nature as to provide a most spectacular display. The starting point will be about 2½ miles from the city of Amiens, but visitors from Paris will be set down by train within a stone's throw of the stand.

Roughly the course is triangular in shape, the first leg being a dead straight line 8 miles in length, of an undulating nature and with only one small village on it. This is an ideal speedway, being one on which the cars can be run with wide open throttle from beginning to end. A sharp turn to the right takes the cars on the second leg of the course nearly 3 miles in length, all of it being straight and level with the exception of the last few hundred yards, which are on a slight downgrade into the village of Moreuil.

The third leg measures a little more than 8 miles of a very wide and slightly winding national highway which twice passes under the main railroad line from Paris to Calais. There are rather difficult turns under the bridges. During the last ½ mile the road is parallel with the first leg of the course, the distance between them being so slight that the whole of the land between the two roads has been secured by the racing board and will be used for grandstands and pits. Spectators within this space therefore will see the cars approaching on the national highway, watch them go round the bend, and see them disappear on the fastest portion of the course.

It is proposed, instead of taking the cars right down to the fork, to build a special cross country road uniting the two parallel

portions of the course. This will make it possible to provide an easier bend and one which, on being banked, can be taken at speed, thus adding to the spectacular nature of the race.

Up to the present year the Automobile Club of France has been afraid to hold a race on a short course, with the result that the events have been rather lacking in interest from the standpoint of the spectator. Partly as the result of experience gained at Dieppe, and partly because of the American examples of short courses, it was decided that the 1913 race should be over a circuit not more than 25 miles round.

The Amiens set of roads being only 19 miles round, are ideal, for they will not only add considerably to the interest of the race for the spectator, but will make control a much easier matter. This is an important matter in view of the fact that this race will be run on a limited fuel allowance. It is intended to run special trains direct from Paris to the grandstands at an inclusive price, the railroad ticket giving admission into the stands. There will also be special fast services from London in 3½ hours.

At the present time there are sixteen cars for the French grand prix race. These are three Sunbeams, three Peugeots, two Delages, one Mathis, three Italas, one Opel, and three Schneiders, the nations represented being England, France, Germany and Italy. Final entries close at the end of the year, by which time it is expected that there will be thirty-five to forty cars on the list.

Many Entries Expected

It is understood that Mercedes will enter a full team, and it is most probable that Fiat and Benz will come in at the last moment. Other firms having the matter under consideration are Motobloc, Piccard-Pictet, Aleyon, Lorraine-Dietrich and Mors.

It is practically certain that the French grand prix will be held during the last week of June or the first few days of July. The 3-liter race, originally fixed for Sunday, June 29, will be postponed until the middle of September in order to give manufacturers an opportunity of taking part in both races and to avoid clashing. The place for the 3-liter race has not yet been fixed.

It is expected that the town of Amiens will vote a subvention of \$10,000 for the French grand prix. Last year's race cost over \$60,000 to organize and left the racing board with a deficit. With the shorter course and the plentiful means of access it is believed that the Amiens course can be made to show a balance on the right side.

Chicago Show to be Palace of Glass

Decorative Scheme to be Radical Departure from Past Practice—Cathedral Effort to be Secured—Huge Painting will be One of Features in Coliseum—Electrics in Armory

CHICAGO, Dec. 23—The management of the Chicago show, held annually in the Coliseum and First Regiment armory and scheduled for February 1 to 15, 1913, has mapped out its decorative scheme. Both of the buildings will be decorated in a manner never before attempted in any exposition building, and, to accomplish this result, the management will make use of material previously used only in connection with the Chicago show and then only in an experimental way.

Strangely enough the New York show management has hit upon a name for its scheme, which, but for that fact, would have been applied at Chicago. It is to be known as the Crystal palace. The plans nevertheless will be entirely dissimilar. The Chicago plan will run to cathedral glass and stained window effects rather than to crystal.

Ornate Effects Expected

The extremely ornate effects which have been such marked features of the center of the Coliseum in the past will give way to more imposing overhead effects. The principal features of the decorative scheme will be found in the ceiling and on the balcony front. Extending from side to side and end to end, completely enveloping roof, girders and every particle of the overhead construction of the building, will be a gorgeous painting of which the principal features will be twenty-six stained glass windows, each 22 feet square. Each window will be of a separate design, in each case a reproduction of some classic work of art. These will be so brilliantly illuminated as to stand out in strong contrast with the remainder of the ceiling, and this despite the fact that the entire building will be as brilliantly illuminated as heretofore. Tests of the scheme already made in the building go to prove that the effect will be the most remarkable of its kind.

Rural Scenes in Balcony

The balcony front, a length of 1,000 feet and to a depth of about 10 feet, will be similarly treated, but the pictures will be rural scenes. There will be three of these in each of the twenty-six sections between the girders of the building. All of the pictures will be framed in massive settings, forming a scene at once impressive, dignified and pleasing.

Beneath the balcony the walls will be paneled in mahogany frames inclosing plate glass mirrors, which will be used extensively also in the ceiling above them. It was from this feature that the show might have properly taken the name of the Crystal palace. Mirrors will be used in profusion, though care has been taken that they shall not offend good taste. In addition to the walls and ceiling they will adorn massive posts erected

below the balcony to disguise the iron girders which support the roof and gallery. These columns will, of course, be ornate and in keeping with the scenes above them.

Simplicity will mark the decorative feature in the center of the building and simple lighting effects will be the predominating feature. Ornamental posts will mark the dividing lines of the spaces and each post will support a cluster of perfectly white 12 and 15-inch electrically lighted globes, designed rather for ornament than illumination. Somewhat similar posts will support the exhibitors' signs, which will be of the same general effect as the windows in the ceiling and on the balcony front and will, of course, be illuminated from the inside and will furthermore be encased in white globes similar to those at the dividing lines. The dividing lines of the spaces, at the aisle front, will be marked by ornamental pillars, each bearing a sign denoting the name of the product of the space occupant.

Other parts of the building will receive equally careful attention. The annex will be completely dressed in new material, one feature of which will be the mirrored panels of the posts and walls. The effect of these, as shown by experiment, will be to give the building an appearance of greater size as well as beautifying the surroundings.

Decorations in Armory

Particular attention is to be paid to the decoration of the armory this season because of the fact that the makers of electric vehicles voluntarily relinquished their claim to space in the larger building in order that all makers of vehicles of that class might be in the same part of the show. They will occupy three-quarters of the center of the main floor and make such an exhibit of electric cars as has never been gathered under one roof. The remainder of the floor will be occupied by gasoline vehicles, as heretofore.

Those who have been familiar with the lofty roof of the armory will hardly recognize the building in its new dress. To all intents and purposes the roof will have been lowered 30 feet, making a far more homey building. It will apparently be completely roofed by a stained glass window, of beautiful design, nearly 100 feet wide and 150 feet long.

Below this all the balconies, except the first, will be hidden by a painted drapery. The upper part of the first balcony, on which exhibits are located, will be richly ornamented, the crowning piece in each section being a cluster of 12-inch globes. The walls and ceiling will be dressed in paneled scenery and real flowers to such an extent that nothing else will be visible. Hanging baskets of flowers, each

basket 10 feet in diameter, will hang over the center of the floor and below them, mounted on pillars similar to those in the Coliseum, will be ornamental globes and transparent signs, which will also form a feature of the decoration of the balcony front.

The lighting of a motor show is a serious question. The show requires about twice as much light as the ordinary exhibition because of the deep colors of the cars and the enormous attendance of spectators. This year the center of the Coliseum will be illuminated by 144 arc lamps, each hung individually.

The show now has 103 exhibits of passenger cars, sixty-three of commercial cars and about 250 of accessories. There are twelve applications from makers of passenger cars, an equal number from makers of commercial cars and nearly 100 from makers of accessories on the waiting list.

ROCHESTER USING THREE BUILDINGS

Rochester, N. Y., Dec. 21—Rochester's show is to be on a more elaborate scale than any previous attempt by the energetic dealers of this place. Three of the largest buildings at Exposition park have been engaged and the show will be staged from Monday night, January 27th, to Saturday night, February 1. Building 3 is to be devoted to accessories, while 4 and 5 will be given over to motor cars. The entrance will be at one end of building 3 and exhibitors and the public will have to walk the length of accessory hall in order to get into the car exhibit. The three-building show will have an aggregate floor space of over 78,000 square feet. F. W. Peck has been re-elected president of the dealers' association, and C. E. Hartson re-elected vice-president.

SHOW FOR NORTH DAKOTA

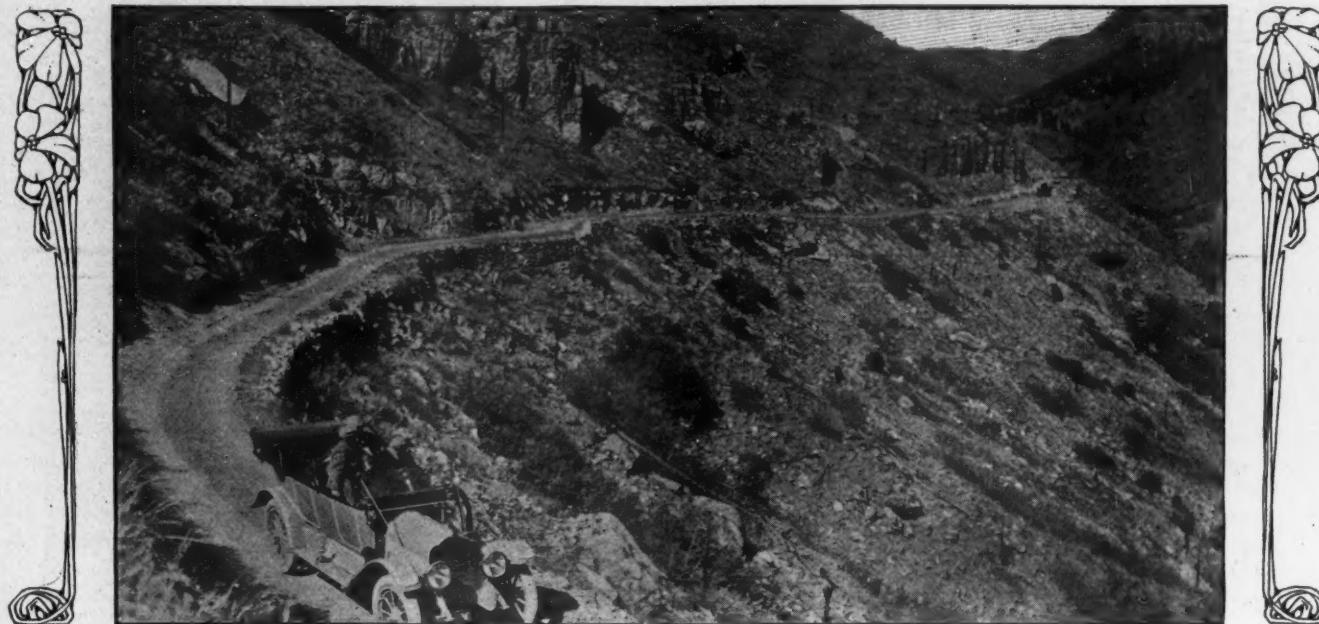
Grand Forks, N. D., Dec. 21—February 18, 19, 20 and 21 have been announced as the dates for the third annual show given under the auspices of the Grand Forks Automobile always has proved successful, both from the standpoint of attendance and results for the Dealers' Association. This is the only motor show of the year held in North Dakota and it dealers. All of the local dealers will exhibit as well as a number of firms from outside the city and state. The officers who have charge of the arrangements for the show are: Leslie Stinson, president; F. H. Haverland, secretary; H. W. Sims, treasurer; James Lyons, advertising manager.

ALBANY SELECTS DATES

Albany, N. Y., Dec. 23—Albany dealers are preparing for an unusually attractive show to be held in the state armory, opening on Saturday night, February 15, and continuing until Saturday night, February 22.

The annual election of officers of the association resulted as follows: President, Chauncey D. Hakes; vice-president, E. McK. Hunt; secretary and treasurer, J. B. Wood. These officers immediately began active preparations for the holding of a representative show.

1000 Miles through Colorado



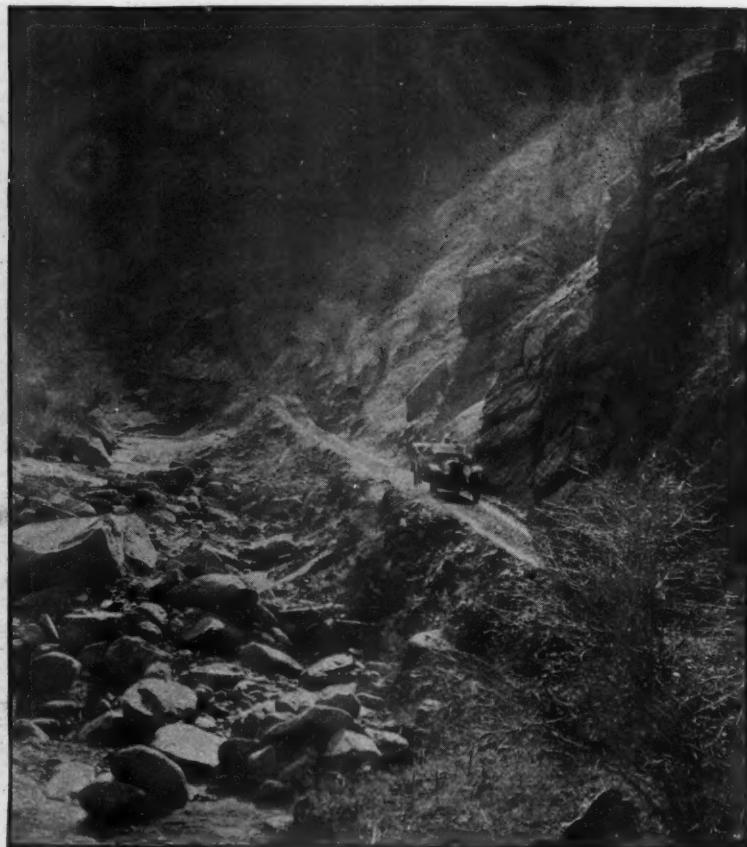
PART OF THE CLIFF ROAD ALONG FOUR-MILE CREEK SOUTH OF PHANTOM CANYON

PHANTOM CANYON

OF the many canyons encountered on a trip through Colorado none will stand out more prominently than Phantom canyon. It extends for about 15 miles just south of Cripple Creek on the road to Canon City. About 1 mile south of Cripple Creek the road enters a narrow canyon where the rocky cliffs tower nearly 1000 feet above. The road is narrow but exceptionally good.

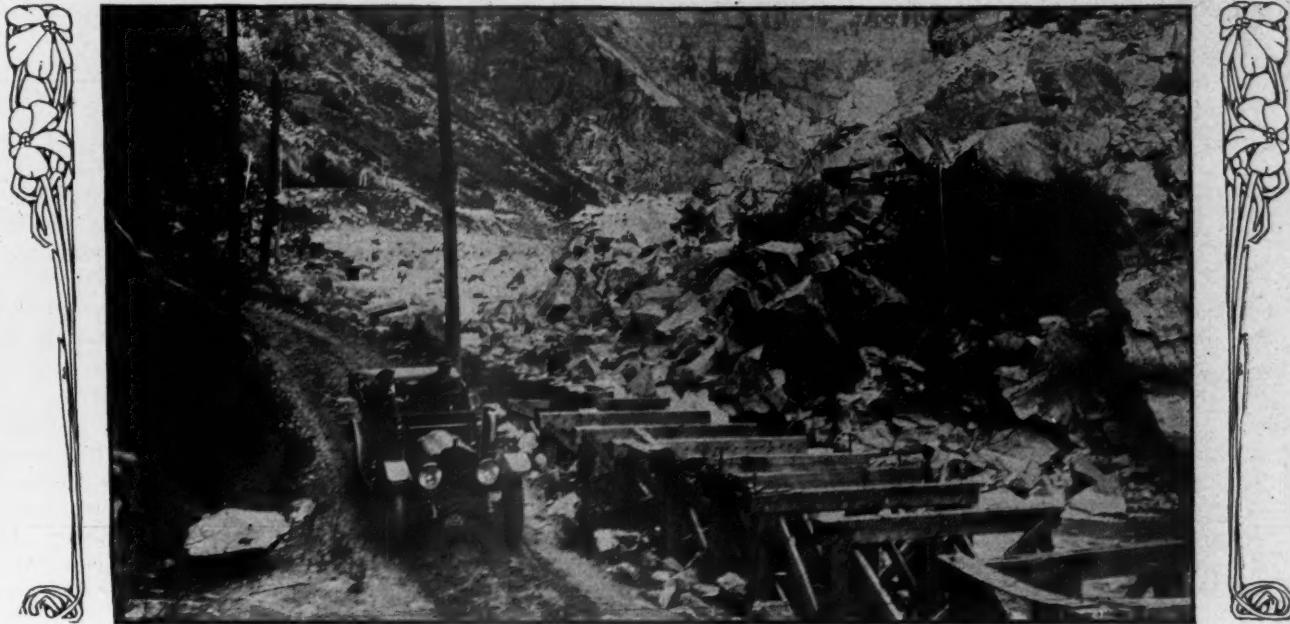


TYPICAL BRIDGE IN PHANTOM CANYON



IN THE DEPTHS OF PHANTOM CANYON

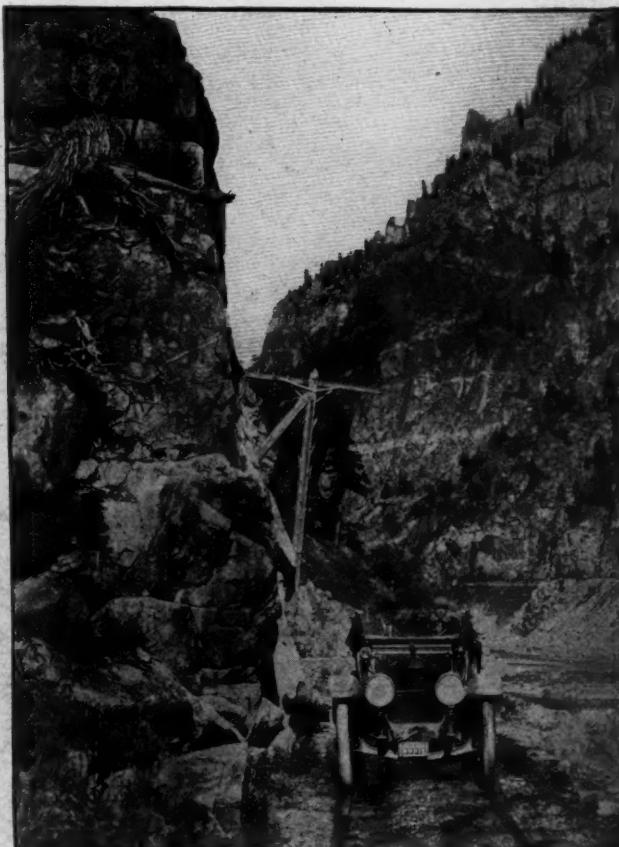
Through the Canyon of the Grand



A VIEW IN THE CANYON JUST BELOW SHOSHONE WITH REMAINS OF FORMER MINING OPERATIONS

THE CANYON OF THE GRAND

THE highway along the Grand river for 18 miles above Glenwood Springs winds and twists along close to the rocks, the latter actually at many times overhanging the road. Unlike the Royal gorge and the Black canyon of the Gunnison where the highway is along the top of the gorge, the road in the Canyon of the Grand is in the bottom of the gorge quite close to the river all the way.



TWO VIEWS IN THE CANYON OF THE GRAND SHOWING THE NARROW BUT GOOD ROAD WITH SHARP TURNS



By Harry Welch

PHOENIX, Ariz.—Editor Motor Age—A glance at the map shows Phoenix, the capital city of Arizona, situated in a central point in the more populous part of the new state. Out from Phoenix run sections of the state highway system, which reach important centers. The road to the north traverses the Salt River valley to the limit of the irrigated area, then out across the uncultivated land over good roads until it reaches Hot Springs Junction, a mile or so from the junction the road branches, and one road to the east, carries one to the famous Castle Hot Springs and its beautifully situated hotel. Here one can rest and enjoy the wonderful hot baths and swimming pools and every convenience that makes life worth living.

To Prescott—the Mile-High City

The main road continues north from the junction and passing through several

towns and camps soon brings the traveler to Prescott the mile-high city. Prescott has a charm all its own. There are no welcomes more warm than those extended by the good citizens of this city situated in the hills, blessed with an invigorating atmosphere that means health and renewed energy. After Prescott still to the north the road reaches Ash Fork, on the main line of the Santa Fe.

Petrified Forest at Adamans

Here the road again divides, one branch going east along the Santa Fe to Williams, Winslow, Flagstaff, Adamans, the station for the petrified forest, and other points of interest. The road also branches to the west paralleling the Santa Fe line running to California. There are branch roads running from Ash Fork to the Grand canyon, and now-a-days trips are made by motor cars across Painted Desert to the Hopi and Moqui villages and to Walpi and Orabi where the snake dances are held each year.

From Prescott good roads extend over into the Verde valley, to Jerome the great copper mine city. From the Verde valley the historic Montezuma's Castle and well

can be easily reached and for those that delight in fishing, Oak Creek offers the best of sport with rod and line.

Leaving Phoenix to the west we take a road which is to be part of the Ocean-to-Ocean highway. This strip of road leads straight to the mountains and is smooth and inviting. We are on the way to Roosevelt Dam. Thirty miles from Phoenix we leave the level road and begin the climb. The great shadow of superstition hangs over the road. This giant pile of rock is one of the most magnificent bits of mountain scenery in the whole United States.

Easy Grade on Mountain Road

Our mountain road is of easy grade, it twists and turns with unending frequency but ever the same easy climb and continually presenting new views and contrasts in rock formation and coloring. This road, now up now down but ever rising, continues for 25 miles when we reach the highest point of the grade and from the crest of a great bluff we look down on the little road house at Fish creek, a tiny toy there in the hollow over 1000 feet below. At this point the roadway is



ABOVE THE ROOSEVELT DAM ON THE ARIZONA STATE HIGHWAY

Touring Information

cut out of the straight up and down sides of a great canyon.

We descended very quickly to see at the foot of the climb the narrow entrance to Fish creek a straight-walled narrow gorge rich with gorgeously colored rocks and filled with spires, steeples and columns of every shape. At Fish creek we lunch, and then on again. For 16 miles more the road is rich with scenery like a Grand canyon in miniature. We skim along smooth roads cut from out the granite hills. Our route carries us along the banks of the Salt river which is here not unlike a friendly bass stream; at last we leave the river and then begins the climb which is to carry us above the height of the dam. We chug along until on rounding a sharp curve, there before us, white, shining in the sun, two giant waterfalls spanning a rainbow arch across its face, is the great monumental structure, the Roosevelt dam. Back of it extending for 12 or 14 miles in each direction, north and south is the great reservoir, the largest artificial lake in the world. A few more twists and turns and

we are on the top of the great wall itself. The roadway on top will allow two motor cars to pass with ease. There are ample accommodations at the Lodge inn on the north side of the dam and from here a road extends northward into the Payson country, where is the great natural bridge and cliff dwelling and other ruins of great interest. There are some ruins of cliff dwellings within a few miles of the dam and the motor car can get to within a mile or so of the spot. From Roosevelt the road continues to Globe, and to Clifton and other points. From Phoenix to Roosevelt is 80 miles and Phoenix to Globe 120.

Road to Tucson

Another division of the state highway from Phoenix journeys over the Roosevelt road to a point about 20 miles from Phoenix, then turns to the south and connects with Florence where is located the state prison, then on again to Tucson. At Tucson is the state university, here also is the San Xavier mission, the finest in the United States. The road from Phoenix to Tucson is in good shape and from



Tucson there are fine highways connecting with Douglas and Bisbee and Nogales and the important cities and towns south along the borders of Mexico. Tucson is very attractive and has splendid hotels and a fine club. The city is on the sunset route of the Southern Pacific system.

There is still another division of the state highway system which centers in Phoenix. This division connects with Yuma on the extreme southwestern point of the state. At Yuma the road crosses into California and this division is also part of the Ocean-to-Ocean highway. Yuma has a large area of irrigated land surrounding the city and is well known as being the location benefitted by the Laguna dam.

All around Phoenix are good roads reaching points of interest. Drives to the orange groves, Indian reservations,



ON THE ROAD WHICH LEADS TO THE ROOSEVELT DAM

ostrich farms and to Painted Rock and to the country club. The splendid winter climate of Phoenix is attracting more and more tourists each year. The visitors come to enjoy the sunshine, dry air, green fields, and blue sky, while in the east is rain, snow and ice.

Phoenix. This city is the center of an area where is to be found an ideal winter climate. From Phoenix all points of the state are easy of access.

Slight rainfalls improve the roads. During a recent visit to the Roosevelt dam, a trip being made by American Geographical Society, the party were held 1 day in the mountains owing to a heavy rain-storm. Next morning the roads were in splendid shape and the thirty cars made the entire trip, going in the rain and returning after the rain without a single accident or mishap of any kind.

No particular equipment is needed in Arizona other than chains and extras. The average cost of gasoline is: Douglas, 30 cents; Phoenix, Prescott, Tucson, and



UNPAVED COUNTRY ROAD NEAR PHOENIX ON THE OCEAN-TO-OCEAN HIGHWAY

Yuma 35 cents; Flagstaff and Roosevelt Dam, 40 cents. Average hotel and garage charges: Hotel, \$1, \$2 and \$3, accord-

ing to location. Garage: 50 cents a night for storage; repairs, 75 cents to \$1 an hour.

Northern Florida a Good Section for Motoring in Winter

By J. H. Reese

KISSIMMEE, Fla.—Editor Motor Age—Winter turns the thought of the motorist southward and he naturally wants to know if road conditions have improved since he last made the trip. If he never has toured in Florida, or if he has and wants to take a different route to his destination, the demand for real information is just as urgent.

Florida has been active during the past year improving the highways that are most travelled, but there has been no organized movement save in the way of preliminary steps.

The state good roads association has been active in getting endorsement of other organizations for a legislative program. The Florida legislature convenes biennially, and next April is the time duly provided by the constitution for the sitting of the state's law-making body.

Good roads talk and newspaper agitation is commendably constant.

The most recent measure proposed is that put forward by Senator Fred Stringer, of Brooksville, Hernando county, for a bond issue of \$50,000,000 for the construction of a state system of highways which shall thread the commonwealth from east to west, north and south. The Stringer plan has been very generally commended by the newspapers, but there are some who have found fault with it. The first of these objections is that the measure proposed by Senator Stringer would have to be in the form of a constitutional amendment. In order for this to pass the legislature it will be necessary for it to receive a three-fifths majority in each branch and then submitted to the people for ratification.

This process would require a period of 2 years before any legislation could be

had under the amended constitution and accompanying the submission of such an amendment would be the uncertainty of the people's verdict which would hinder any other legislation looking to the construction of any kind of state-wide system. Briefly stated, this is the objection to the Stringer plan. It may be that with the newspaper influence behind it that this plan will be adopted and that Florida will gain much valuable publicity because of its advance step in the building of a good roads system that will be worthy of the name. It cannot be doubted, however, that if the legislature goes on record as favoring the Stringer plan that other projects will be deterred or abandoned altogether.

Bonding for Good Roads

In the meantime the counties are going ahead with the agitation for individual betterment. Orange county, just to the north of Osceola county, made a vain effort to bond for \$1,000,000 for the construction of brick roads. Failing to carry the issue for the whole county the county was sub-divided, and the Sanford—celery center—district voted for \$200,000 for brick roads. This will give that district 25 miles of brick highways at the present cost of construction in this section. The Orlando district is to vote soon on a proposed issue of \$300,000 for brick roads in that district. Osceola county, which never has done anything in the way of extended road building, is now talking of a bond issue for half a million, and it is likely that an election will be called soon.

This is perhaps the most active county in the state when industrially considered and this lends attractions to the motorist that have their certain allurements. The county is of a shoe-string pattern, being between 80 and 90 miles



CABBAGE PALMETTO HAMMOCKS ON THE KISSIMMEE PRAIRIE



A PAVED COUNTRY ROAD NEAR PHOENIX, ARIZ.

long. The stretch of road used by the through state motorist from Jacksonville to Tampa is but 15 miles long, passing through the northwest section of the county from Orange to Polk. This stretch of road gives but a vague and even erroneous idea of the character of the country through the peninsular portion.

Starting south from Kissimmee to Whittier the roads are just as they have been made by travel and without much work. They are for the greater portion sand roads, which prove to be the best natural roads for this portion of the country with its excessive rains. The sand packs hard and is of no hindrance to smooth travel.

The sand of this section should not be confused with the sand of the flat woods

section in the northern part of the state; it is a different kind of sand, or is rendered to a different condition through climatic influences. From Whittier, a primitive community 45 miles below Kissimmee, the road is through the open prairie. The prairie roads are better known and more correctly designated as trails. The travel over them is insufficient to keep the grass down and for many miles the stretch is through an open country over these grass-grown trails.

Fine Road for Motoring

There are no obstructions to speak of and the motorist may bowl along for long distances at a good rate of speed without fear. So long as the trails run on the ridges there is no complaint to be found, but there are the sloughs and low places to be met and contended with. It would require but little work to put these comparatively few places in condition, but the county is a long one. This road alone is over 80 miles in length and the solitary road gang employed by the county is inadequate to deal with the difficulties.

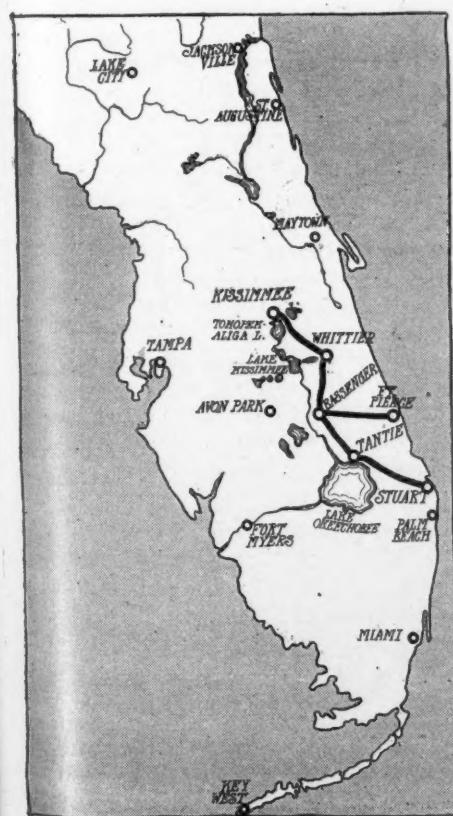
The real significance and importance of this prairie trail through Osceola county are discovered in the opening of these prairie lands to settlers from the north

and west, as well as other sections. These particular sections are being drawn from them and in the course of a few years this county will have several thousand new settlers, whose presence and tax paying productiveness will bring good roads even without the necessity of large bond issues. Moreover, the coming of the land companies has made it apparent to the older residents that good roads are imperative to the development of the country.

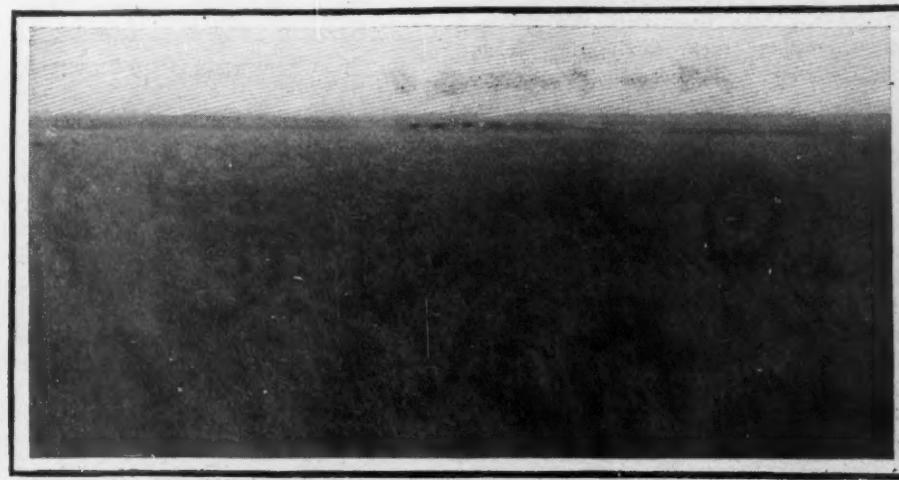
This article can be nothing more than general, for it would be hazardous for the motorist to attempt a trip through the prairie without a guide. The prairie trail is being used by local motorists to connect with the east coast at Ft. Pierce and West Palm Beach and then on to Miami. This route is interesting and out of the usual, and it is declared by some to be just as good a route and just as easy of travel as the Miami to Quebec route on the east coast. It would certainly afford variety to the motorist who cared to start from Jacksonville on the highway to Tampa and switch at Kissimmee from this point to the lower east coast resorts.

Captain Fred Hunter, of Kissimmee, is an authority on the prairie trails and has numerous blue prints that he is prepared to furnish upon request. He is a practical motorist and asserts the prairie roads to be better than the regularly travelled highway between Kissimmee and Tampa. After the east coast is reached at the points mentioned the roads are as good as could be wished. From West Palm Beach to Miami, this is particularly true. The distance is 66 miles and is easily covered in 2 hours. The roads are made of the natural coraline limestone, which makes a splendid road in wet weather with one fault in dry weather, that being serious only when it is much traveled; it cuts easily and the dust and pot-holes are bad.

There are two routes for reaching the east coast. One leads from Bassenger across to Ft. Pierce and is the shorter, being a matter of 4 hours from the Hunter camp. The other goes to Tantie on the north shore of Lake Okeechobee and runs in an oblique direction to Stuart.



NORTHERN FLORIDA ROUTE



A PRAIRIE TRAIL TO KISSIMMEE, FLA.

Keeping the Car Warm

Four Principal Types of Motor Car Heater Described for Hoosier Reader

EVANSVILLE, Ind.—Editor Motor Age—State the best method to keep a touring car warm.

2—Is there any chance of taking up an annular bearing in a front wheel?—Ohio River Contract Co.

1—As the word best has such a flexible meaning, and as preference is such an important factor, it is not possible to point out any particular type of warmer as better than any other. Those that have been found serviceable in use are of four types. The first of these is the old-fashioned carriage warmer which consists of a flat heater, in which special briquets of prepared coal are burned. This coal does not give off offensive gases nor smoke, and will burn or rather glow for several hours without attention. In later years, exhaust heaters have come into use. These consist of three-way valves which permit the exhaust gases to be deflected from the muffler to a gas radiator in the floor of the car, from whence it is ejected at the rear, the heater acting as a cooler and muffler of the gases. Another means of likewise using the heat ordinarily wasted by motor cars is to pipe the water from the engine back to a hot-water radiator in the tonneau, before admitting it to the radiator. This is a severe tax upon the pump, however, and on some cars it will not work satisfactorily. Another type which has not as yet come into general use, but which promises to become popular is the electric type.

2—Bearings of this type when worn must be replaced with new ones. As a rule they will have served a legitimate term of service before this becomes necessary.

USERS OF SPECIAL MOTORS

WATERLOO, Ia.—Editor Motor Age—Give me a list of cars using the Continental motor; also cars using the Rutenber motor.—L. L. Collins.

The Continental motor is used by the Pathfinder, Ames, Speedwell, Abbott-Detroit, Bessemer truck, Lexington, McIntyre, Halladay, and Hudson. The Rutenber motor is used by the Lambert, Firestone-Columbus, Alpena, Halladay, Triumph, Lexington, and Nyberg.

SUBMITS PRIMER PLAN

BURLINGTON, Ia.—Editor Motor Age—I have on my car a priming cup the pipe of which is connected to the intake pipe; but I find that this is not as efficient as priming through the regular priming cocks above the valves. Now, I have in mind a primer that will with one turn on the dash prime all four cylinders at once, but as there must be a pipe from primer to each cylinder connecting the regular priming cocks and above the valves, what would

The Readers

happen when the explosion takes place? Would there be any harm done in these small pipes? Of course there would be only enough gasoline let in at one time to prime the motor; the flow would be cut off before the engine was cranked.—A Subscriber.

Your device is all right as far as it goes, but to contemplate running an open lead to each pet-cock, through which to inject gasoline, is to court danger. The first explosion would either burst the tube, blow out the dash valve, or in case the valve was open or leaky, run back to the tank. To complete your device you will need to add a little device known as a check-valve to each lead where it enters the cylinder. A check-valve is a passage in which a valve element is so arranged that passage of fluid in one direction is unobstructed, but which makes a return now impossible. Two types of such valves are shown in Fig. 2. The one on the left is a spring-retained poppet valve. The other is a ball check, the ball floating in the body of the valve. At the outlet of the valve is a spider, which stops the ball from passing out of the valve, allowing the passage of fluid around it. At the inlet is a seat for the ball that just fits it, so

to the gasoline tank and to the engine check-valves, respectively. The operating levers are linked to a single handle, which if moved in one direction permits the gasoline to flow from the tank to the standpipes, and in the other direction, allows these measured charges to flow to the engine. The other differs in that the standpipes communicate with the tank through a single supply valve, at their tops, while they discharge it through a series of cocks at the bottom. This requires two controls, but is the cheaper and simpler construction. In each figure is shown a section of the vents that are necessary to allow the filling and draining of the standpipes. They are made by drilling the pipe-end caps with a very small hole, countersunk on the inside, and inserting a cork ball loosely between the hole and a screen beneath it.

RACE MEET ATTENDANCE

MILWAUKEE, Wis.—Editor Motor Age—What was the official attendance at the free-for-all race at Elgin, August 31, 1912. Also the official attendance at the Vanderbilt and grand prix races held in Milwaukee this fall?—A Subscriber.

No official report has been made on

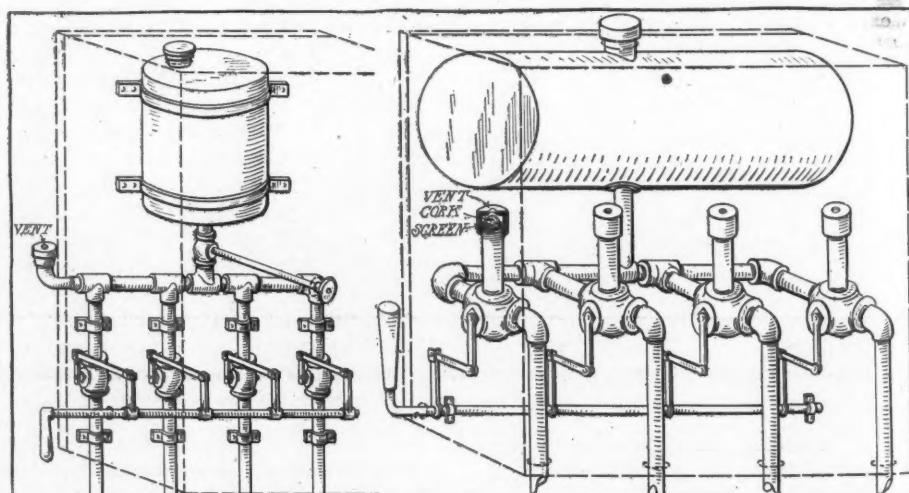


FIG. 1—MEASURING AND DISTRIBUTING PRIMERS, MADE OF PIPE FITTINGS

that pressure in a reverse direction will force the ball back and block up the opening. You would not get very good results from your primer unless you made provision for equal distribution of the fluid to each of the cylinders, and unless you provided a positive method of measuring the exact amount of gasoline fed to each. Two simple methods of effecting these results are shown in Fig. 1. These are each made of standard fittings. The one on the right consists of four three way cocks, for a four-cylinder engine, the common leads of which connect with vertical standpipes, and the opposite leads

either meet. It is estimated that Elgin had about 40,000, while the attendance at the Grand Prix was placed at 100,000.

DESIGN FOR PUBLIC GARAGE

LINCOLN, Kan.—Editor Motor Age—Please publish plans of a garage. I have a lot 50 by 120 feet between two other buildings and desire a garage which will give car owners the best service possible. The building will face the south and I want show room and office in the front on side of the door. Would it be better to have a garage with a door in the middle? What kind of a roof is best suited for such a building? I want a repair shop in

Clearing House

the rear. What about the location of oils and gas, also supplies and repair parts, and which makes a better floor, brick or cement? I do not want an expensive building but want a good, practical one.—R. E. Curtis.

Fig. 3 shows a type of small service garage, 50 by 110, with a 10-foot area in the rear. There are two 10-foot doors in front, separated by an office 25 feet wide. At the front is a full-width show-window, with a glass back. Behind this is desk-room, separated from the office by a railing or show-case. The office is fitted with cases for the storage of tires and accessories, and communicates with the side passages by doors on each side. The rear of the office is provided with large windows, so that the south light may go through the show-window and office into the garage. This also permits the proprietor to watch the garage while attending to the office end of his duties. The garage itself is a full-width area, preferably without pillars, over which is a large trunk light. Dividing this from the repair shop is the washrake, convenient to both portions of the establishment on the east side, while on the west side are the toilets, janitor's closet, and a set of lockers. A wide sliding door at the rear opens into the area, which will be found convenient as a place to leave cars temporarily, without being left in the alley. Against this back wall, to the west is a bench of generous proportions, while between this and the lockers are the motor and machines. On the opposite side of the repair shop is an open space for the cars being repaired to stand. At the rear of the east side is a supply locker, a tool cabinet, an oil cabinet, and the main gasoline pump. A branch gasoline and oil sta-

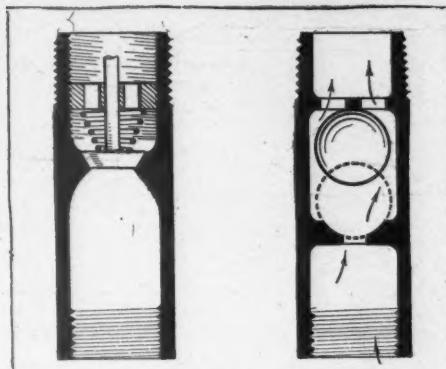


FIG. 2—TWO FORMS OF CHECK-VALVES

tion is located behind the office for the benefit of transient trade. The gasoline is stored in an underground tank in the area, filled from above. The best roof for such a garage is an arched trussed affair that provides ample strength without necessitating any pillars. Cement is to be preferred as a flooring material to brick as it is more even and easier to keep clean. With the doors of glass in vertical panels, a surprisingly decorative effect is produced, and an abundance of light admitted, with only a slight additional cost over that of the usual type of garage door.

STOPPING FORD REAR AXLE LEAK

Jasper, Mich.—In Motor Age, issue November 28, was a complaint from Mr. Garner about the trouble he is having with his Ford car leaking oil around the brake bands through the rear axle. I had the same trouble with my car until I put on a new felt washer which had previously been varnished on one side and which absorbed the varnish about half the width of the washer. Since then it has not leaked a drop of hard oil.

Air-Cooled Two-Cycle Features of Design of Light Cars and Rare Type of Engine Discussed

LOCK HAVEN, Pa.—Editor Motor Age—What is the street address of the Metal Preservative Co., Chicago?

2—In Motor Age, issue November 14, it is stated that the magneto in the new Studebaker is placed near the front. How is the magneto protected from water, sand, etc.?

3—Is there any make of pleasure car using a direct air-cooled, two-cycle engine such as is used on the delivery truck put out by the Brockway Motor Truck Co., Cortland, N. Y.?

4—How does the two-cycle, direct air-cooled engine compare in efficiency with the water-cooled, poppet-valve engine?

5—Is there to be any radical change made in the Ford line for 1913?—J. Milton Lord.

1—The Metal Preservative Co., is located at 1137 Randall place, Chicago.

2—The position of the magneto on the Studebaker is sufficiently high as to make it more proof against water and sand than when placed in the conventional position at the side of the crankcase.

3—The Duryea Buggyaut uses such a motor. The Jonz and Page-Adrian, no longer manufactured, used motors of this type.

4—Theoretically a two-cycle motor or an air-cooled motor, either one will produce higher efficiency than the standard type, so that the combination of the two features in one engine may be considered a theoretical ideal. In practice, the results attained have never measured up to the promises of such engines from an abstract standpoint. This is to be attributed to the lack of development that this type has undergone. However, motors of this type are reputed as highly satisfactory in the hands of users.

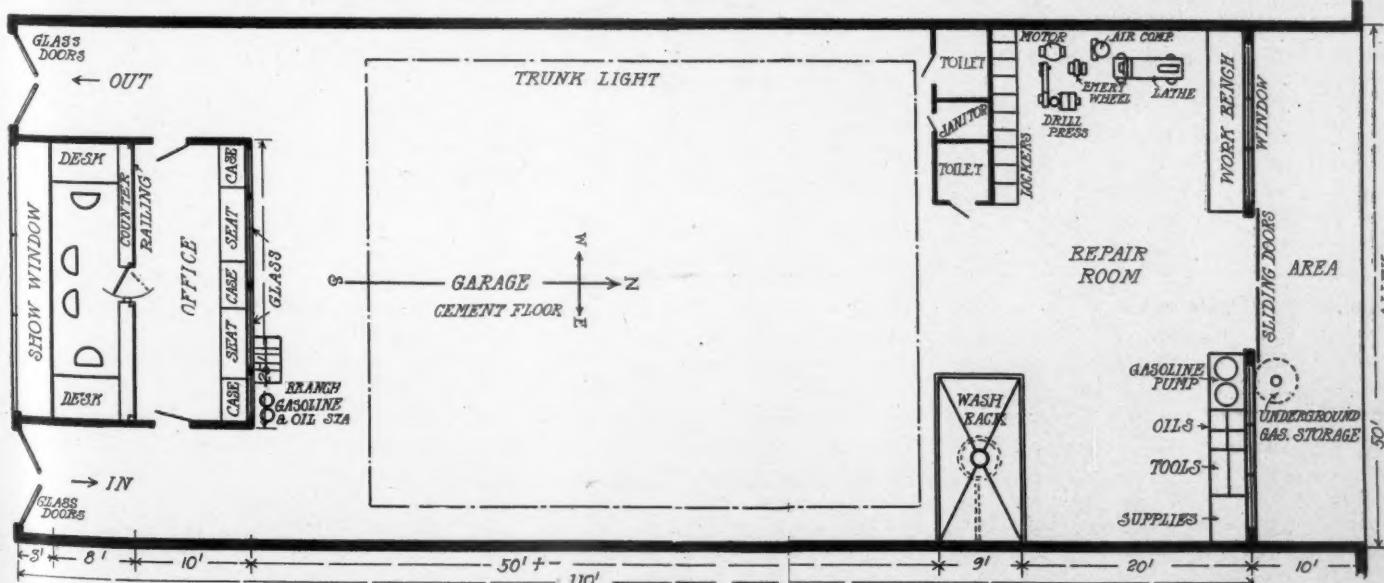
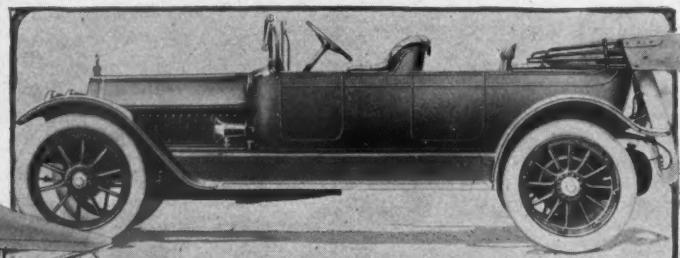


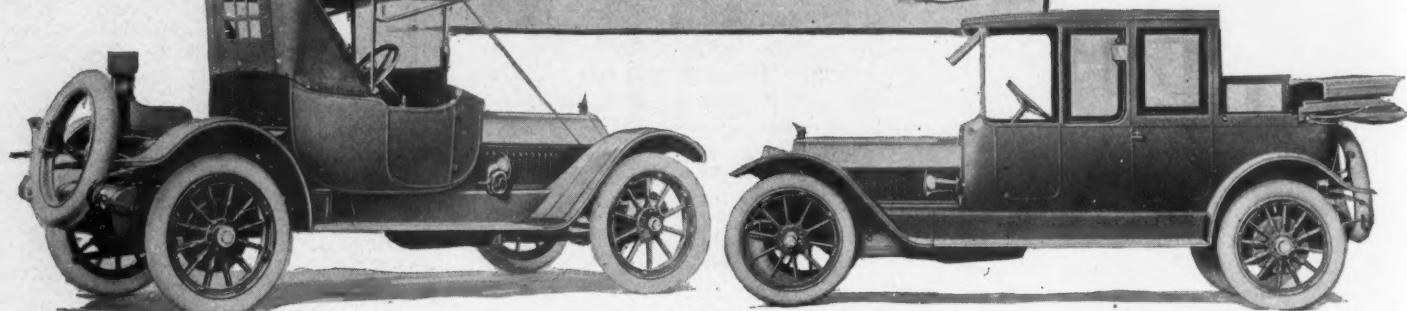
FIG. 3—PLAN OF ONE-STORY GARAGE AND REPAIR SHOP, 120x150

Stearns-Knight Six-Cylinder Is Announced

Cleveland Concern
Enters Six-Cylinder
Field for 1913



General Character of
Motor Not Al-
tered Much



IMPROVED TOURING CAR, ROADSTER AND LANDAULET ON SIX-CYLINDER STEARNS-KNIGHT CHASSIS

After 16 months of the exclusive manufacture of a Knight type of four-cylinder machine, the Stearns company has broadened its activities in this line by adding a six-cylinder Knight-equipped car.

The new model comes in two chassis lengths—134 and 140 inches—for which six body types are provided. They are very attractive in appearance and designed along the same lines as those mounted on the four-cylinder chassis.

Mechanically a number of changes have been made in the car as compared with the four-cylinder type. The motor, however, is little altered in design from that already perfected for the special needs of the Stearns construction.

Longer Stroke Used

The bore of the new motor is the same as that of the four-cylinder type, $4\frac{1}{4}$ inches, while the stroke is $\frac{1}{4}$ -inch longer, being $5\frac{1}{4}$ inches. According to the S. A. E. formula for poppet-valve motors, this gives a rating of 43.8 horsepower, but the makers claim 50 per cent in excess of this amount, since on the block the engine shows upwards of 80 horsepower. This of course gives ample power for any demand, and it was for the class of motorists who desire to have plenty of reserve power for all emergencies that the car was primarily produced.

In the Knight sleeve-valve construction there are two concentric sleeves which are assembled between the cylinder wall and the piston. These sleeves move up and down by means of connecting rods which are actuated by cranks mounted on an eccentric shaft. In the upper ends of the sleeves and on either side, slots are cut. When these slots or openings in the two sleeves register with one another and also with the corresponding opening in the cylinder wall which communicates with the

inlet or exhaust manifold, as the case may be, there is a passage from within the cylinder to the manifold.

The two slots and the cylinder opening are so located relative to one another and the timing of the sleeves such that only at the proper time for inlet or exhaust of gases do the three ports begin to register, opening their full amount at the time when the piston is in the correct position and closing again at the proper time. The Knight motor operation has been exhaustively treated in Motor Age on several occasions since its inception, hence this short explanation will suffice here.

The sleeve travel is the same as that used on the four-cylinder Stearns-Knight— $1\frac{1}{8}$ inch. This is about one-tenth the travel of the piston, and with this small movement it is very easy to give the sleeves all the lubrication required.

The ports are of the same width as in the four-cylinder motor, the inlet port being less than the exhaust. The length of these ports is, however, longer than in the other design by $\frac{1}{4}$ inch. These dimensions in the new motor follow:

	Width	Length	Degree
Inlet port....	$\frac{1}{2}$ in.	$5\frac{1}{4}$ in.	142
Exhaust port....	$\frac{3}{8}$ in.	$5\frac{1}{4}$ in.	142

Large Port-Areas

Ports of this size should allow for very complete passage of gases either into the cylinder or from it. The exhaust port is made larger than the inlet obviously for the thorough exhaustion of all burnt gas.

The motor has seven bearings for its crankshaft, one between each two cylinders and one at either end. This construction should make for extreme rigidity, preventing any appreciable vibration due to crankshaft whipping. The cylinders are cast in pairs as heretofore.

As in the earlier motor, the new six has its eccentric shaft driven by silent chain. This also is true with regard to the drive

of the magneto shaft, which is located on the opposite side of the motor from the timing shaft. Both chains are inclosed in oil-tight cases.

The carburetor is of the expanding type, fuel being supplied to it by pressure. The fuel tank is located at the rear of the car, which location is rapidly becoming the predominant one among American makers. Ignition is provided for through the use of a dual system employing Mea magneto, single coil and storage battery. The magneto is mounted at the end of the pump shaft on the left side, driving through a special coupling.

Same Lubrication System Used

The lubrication system does not differ materially from that of the four-cylinder Stearns-Knight, the only changes being occasioned by the addition of two more cylinders. It combines force-feed and splash. The varying level oil troughs into which the connecting rod ends dip in traveling around are the special feature of this lubrication system. These troughs, one for each connecting rod, are connected with the throttle so that the more the latter is opened the more they are raised and the more oil they will hold. The result of this is that with the increase of throttle opening and consequent increase of engine speed, the greater is the supply of oil for splash to the bearings, sleeves, cranks and so on.

Oil is circulated by a gear pump, which draws its lubricant from a reservoir at the bottom of the motor, to which the oil eventually runs after having been splashed to the working parts. A lead from the pump runs to the dash sight feed, while six other leads direct oil into the troughs. Another pipe conveys oil to the fan bearing and to the chains at the front of the engine. An auxiliary oiling system connected with the throttle comes into

play at excessively high speeds or under heavy loads to assist in the sleeve lubrication. The sleeves are provided with grooves which assist in the even distribution of oil over their bearing surfaces.

Electrically Started and Lighted

The Gray & Davis lighting and starting system is incorporated in the Stearns-Knight six. This system is composed of two separate electrical units—an electric starting motor and a generator. The starting motor operates through a reduction gearing to a sliding pinion which engages a large ring gear of steel in the flywheel. Pressure on a foot lever throws the switch, making electrical connection between the motor and the storage battery. It also shifts the gear, which is completely in mesh before full current is sent to the motor. This starting motor is carried on a bracket back of the engine and bolted to the frame, while the reduction gear case, shifting and engaging mechanism, is supported by the transmission case. A universal joint between the electric motor and its gearing allows for any slight play between the two.

The electric generator which charges the storage battery and which aids the latter in supplying the lights, is mounted on the left side of the engine on a bracket above the pump and magneto shaft, as seen in the illustration of the exhaust side of the engine. The generator is driven by a silent chain from the pump shaft. A case completely incloses the chain and its sprockets. On the four-cylinder model, the generator also is driven by silent chain from the magneto shaft, but it is at the front of the engine, its chain being inclosed in the same case with the eccentric shaft and magneto shaft chains.

Primer is Fitted

The motor is equipped with a priming device, the function of which is to fill the intake manifold with air saturated with gasoline vapor. This is obtained from the top of the gasoline tank, such saturated air being always present in the tank except immediately after filling. The primer is simply a needle valve which permits communication between the air

pressure line and the intake manifold, and is operated by a knob on the dash.

The suspension of the motor is a new feature. The forward end is hung on a steel arched cross-piece which in turn is bolted to the side rails of the frame, replacing the aluminum integral arm construction. A separate cross member supports the radiator and braces the frame rigidly at this point. It is removable with the radiator for the inspection of the front of the motor. This gives a three-point support, which is usual in motors of the length of the new six, when mounted direct on the frame.

Integral arms support the rear end of the engine, bolting direct to the side rails of the frame. These arms have an exceptionally wide surface to withstand any strain which may be imposed upon them.

United Power Plant

A radical departure from the design of the four-cylinder Stearns-Knight is the location of the gearset in unit with the engine. The gearset is placed in unit with the rear axle on the four. In the new design the combined clutchcase gearbox bolt directly to the end of the crankcase. These housings are very compact and close-coupled in form. The clutch is a multiple dry-disk type of the same general design and construction as

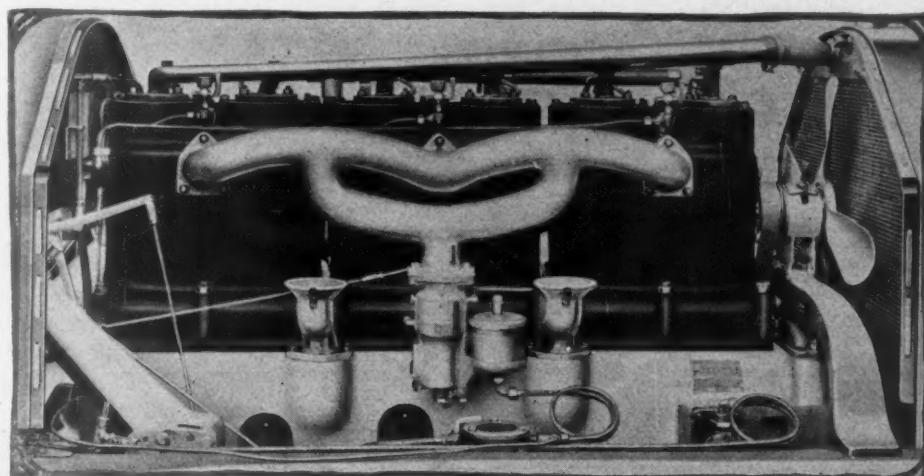
on the other car, but being larger and stronger to correspond with the increased motor power.

The gearset is a four-speed type, selective. This is also a new feature in that the earlier car utilizes a three-speed design. The entire gearset system is mounted on annular ball bearings. The gear ratios are given: First speed, 11.7 to 1; second speed, 6.7 to 1; third speed, 4.8 to 1; fourth speed, 3.7-16 to 1; reverse, 11.7 to 1.

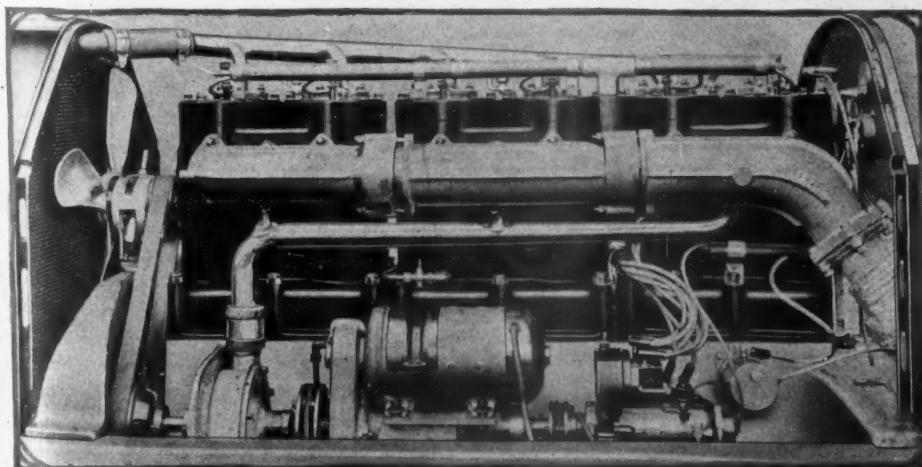
Two Universals Used

Drive beyond the gearset is through a propeller shaft of ample proportions, which is fitted with two universal joints and lubricated by grease-cups on the ends of the pivoting pins, making four on each joint. The shaft transfers the power through the usual bevel drive and differential to the axle shafts. The rear axle is of the floating type, the car weight being carried on the axle shaft housings. The front axle is a one-piece I-beam, forged from alloy steel. The wheels, of artillery type, are carried on Timken bearings, and the double hub brakes act upon the rear pair in the conventional manner. The front wheels have ten spokes while the rear are constructed with twelve. They carry 37-by 5-inch tires all around.

The frame is somewhat different in form



STEARNS-KNIGHT SIX MOTOR, SHOWING SPECIAL CARBURETER



EXHAUST SIDE OF SIX-CYLINDER STEARNS MOTOR

from that of the fours, in that there is no drop in front of the rear axle. It runs straight back, the upper side of the channel being on the same plane throughout, except that at the extreme rear there is a kick-up to clear the rear axle. The frame is well braced by cross members, there being three back of the power plant, one just beyond the gearset, one midway between this and the rear and another at the extreme rear. These are in addition to the cross members already mentioned in connection with the motor and radiator mounting.

The front springs are half-elliptic, while the rear are three-quarter elliptic and mounted outside of the side frame rails. Grease cups are provided on the shackle points, while guides prevent the spring

leaves from getting out of their normal positions.

Steering and control are on the right, being retained as heretofore. A hardened steel worm and gear are notable features in the steering mechanism. The steering wheel has a hard rubber corrugated grip, its diameter measuring 18 inches. Spark and throttle levers are located on the quadrant above the wheel, while gear-shift and emergency brake levers are at the driver's right within the body. Pedals and accelerator are standard.

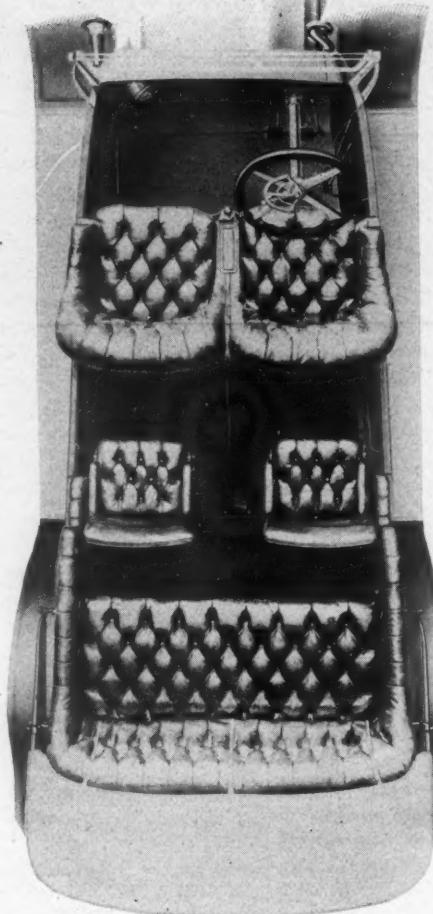
Turning to a consideration of the bodies we find the Stearns characteristic features in evidence. The touring bodies are all of the flush-sided type, and though somewhat longer than the four-cylinder types are equally as attractive. A shallow, narrow molding parallels the top of the bodies and outlines the doors. The door handles and door hinges are entirely concealed in accordance with present-day body fashions, and the running boards are also entirely clear, carrying no battery or tool boxes.

Special tire carriers are provided at the rear for spares, these holders bolting to the ends of the side frame rails above the spring clamps. The upholstery is deep and resilient.

The equipment is inclusive of all requisites for the road, consisting of speed-side curtains, slip cover, electric and bulb horns, quick-detachable, demountable rims with two extras, ventilator door hooks, robe rail, foot-rest, and so on. The tread is 56½ inches on all models.

GARAGEMEN COOPERATING

Chicago, Dec. 21—At the annual meeting of the Chicago Garage Owners Association, held at the Lexington hotel Wednesday night some very clever schemes were brought to light. Although not making its inner working known to any extent, the association has been do-



BODY ARRANGEMENT OF NEW STEARNS SIX

ing much toward improving service to be rendered to motor car owners.

It is the object of the garage owners represented to work in unison with respect to the buying of car parts and accessories in large quantities. This would effect a great saving on the part of the association members and hence they would be in a better position to cut the expense

bill of the car owner considerably.

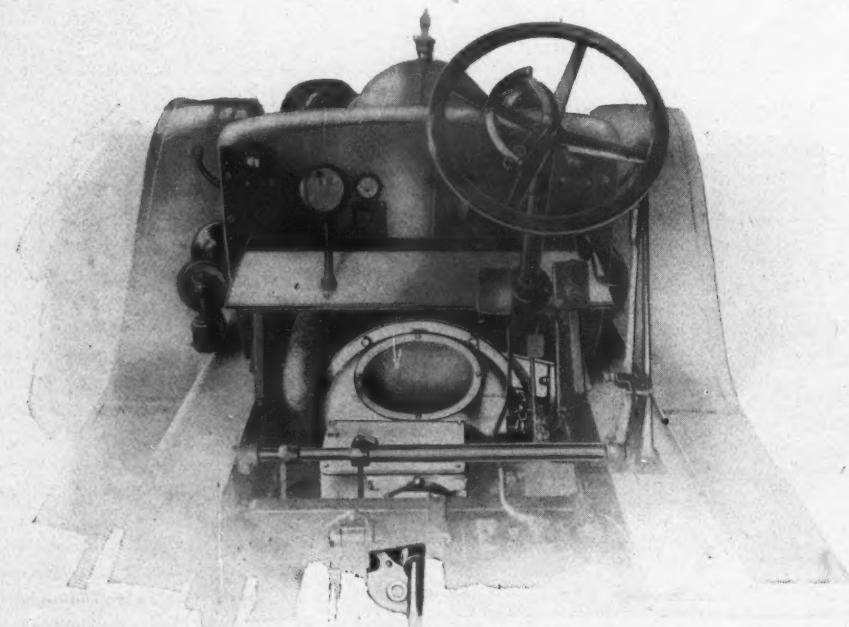
The members not only work towards costs but have been paying much attention to the quality of service. For example, a committee was appointed to consider the advisability of adopting a soft soap with certain qualifications. These men found that in order to give satisfactory results in cleaning the soap must contain certain ingredients. A number of soap manufacturers were interviewed with the result that the particular soap desired is being manufactured and sold to the association in very large quantities. The soaps formerly used were quite cheap enough, but by constant use the paint on the motor cars was injured.

The buying of car parts and accessories in large quantities has not as yet been done, nevertheless committees have been appointed to look into the matter and report immediately.

Much consideration has been given the owners of electric vehicles so much so that a booklet is about to be issued that will be placed in the hands of every electric owner in Chicago. This booklet will contain a list of the city's garages, segregated by location. Should a mishap occur the owner needs only look in this book for the nearest garage instead of telephoning to his own. Furthermore, all cars housed in the garages of members of the association, will have a card under the battery hood to be used as a means of identification. These cards will be changed in color monthly.

The plan should work out in this way: Mr. A is driving his electric down Michigan avenue, when it suddenly stops. Now under the old regime he would call up his garage and the latter would in turn send a car out to haul in the dead car. But under the new system he would look into the book placed in his car by the garage owner and find out what garage is nearest the place where the mishap occurred. Should this garage be one belonging to the association no charge whatever is made for getting the car in running order, but in the necessity of the replacement of parts, and this only at the will of the owner, the charges are made accordingly. Of course, the first thing the garage man does to ascertain whether the car is housed in one of the association garages is to look under the battery hood and there he will find a card of a certain color. As has been stated, these cards have a different color each month, so that if the car has a red card and it should be blue it means that that owner has not yet received his monthly statement.

The annual meeting also resulted in the election of officers for the ensuing year. The president, W. L. Rude, was unanimously re-elected. M. Ross was chosen as vice-president and Harry Salvat, treasurer. In the future the association will hold two monthly meetings, one for the discussion of gasoline cars and the other for electric vehicles.



STEARNS-KNIGHT UNIT POWER PLANT, VIEW OF DASH, SHOWING CONTROLS

Lozier Introduces New Light Six Model



ULMINATING in the production of a second model, the Lozier practice of single-chassis production is abandoned in 1913. The Lozier Motor Co., Detroit, has branched out and has added a model of less horsepower to its line. The new car is bristling with features which up to now were foreign to Lozier construction.

It is to be known as the light six, so called to distinguish it from little sixes.

Although slightly smaller than its older brother, the new car has a wheel-base of 127½ inches, which, strictly speaking, puts it out of the small car class. In this dimension it is only 2½ inches shorter than the other model. It marks the advent of the Lozier company into the medium-priced class, while still maintaining its position in the high-priced aggregation.

Power Exceeds Rating

The rating of the new car is 36 horsepower, but with its long stroke motor it will develop considerably more than this amount. The bore is 3½ inches while the stroke is 5½ inches, given a stroke-bore ratio of 1.52 thus putting the car in the long-stroke contingent.

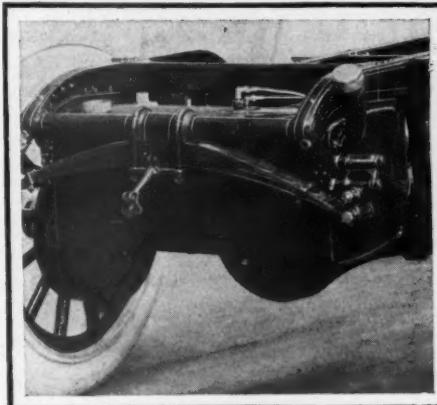
The motor is an L-head type with its cylinders cast in threes. The design is new to Lozier construction, the larger car having a T-head motor and its cylinders being cast in pairs. The unit power plant feature is retained, however. Inlet and exhaust valves are on the right, and there is an individual connection from both inlet and exhaust manifold for each cylinder, as shown in the motor illustration.

Valve springs and stems are completely inclosed by cover plates, one to each block of three cylinders. Two thumb screws hold each plate in place.

Valve-lifters are of the rocker type, it being the claim that this form is somewhat quieter than the ordinary straight lifting type. Valve stems are provided with check nuts which make for easy adjustment. The springs are tapered and constructed from tempered steel wire, the reason advanced for the use of taper springs being that they permit of truer valve seating than do straight springs, and that they also prevent uneven valve stem wear.

Three-Bearing Crankshaft

There are three main bearings, whereas a crankshaft mounted on four ball bearings is used in the type 72 motor. Both connecting rod and main bearings consist of bronze shells lined with a white bearing metal. The crankshaft is a drop forging, the flywheel flange being integral.



NEW REAR SUSPENSION OF LIGHT SIX
LOZIER

Connecting rods are drop forged from carbon steel and their straps are held on by two bolts each. Bushings are made up in halves and are assembled with thin

shims between the upper and lower portions, these shims allowing for adjustment.

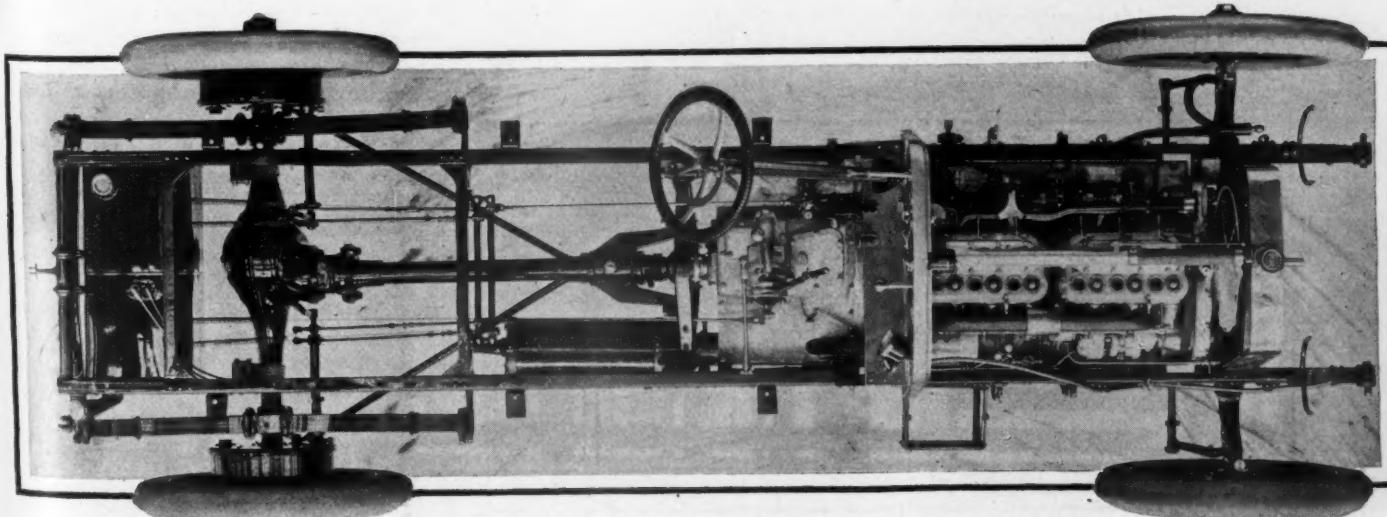
Pistons have four rings, three above the wrist pin and one below. The rings are of the eccentric design, the lower one acting as an oil ring to prevent the lubricant from working up into the combustion chamber. Oil grooves are cut in the piston faces to aid in the even distribution of the cylinder oil. The wrist pin is secured against turning or shifting by means of a set screw which passes through one of the bosses. In general, the pistons of this new Lozier are very light, each weighing about 3 pounds without rings or wrist pin.

Cams are forged integral with the cam shaft. Four phosphor bronze bearings carry the shaft which is easily removable through the front of the crankcase. Timing gears are helically-cut and completely enclosed in an oil-tight case.

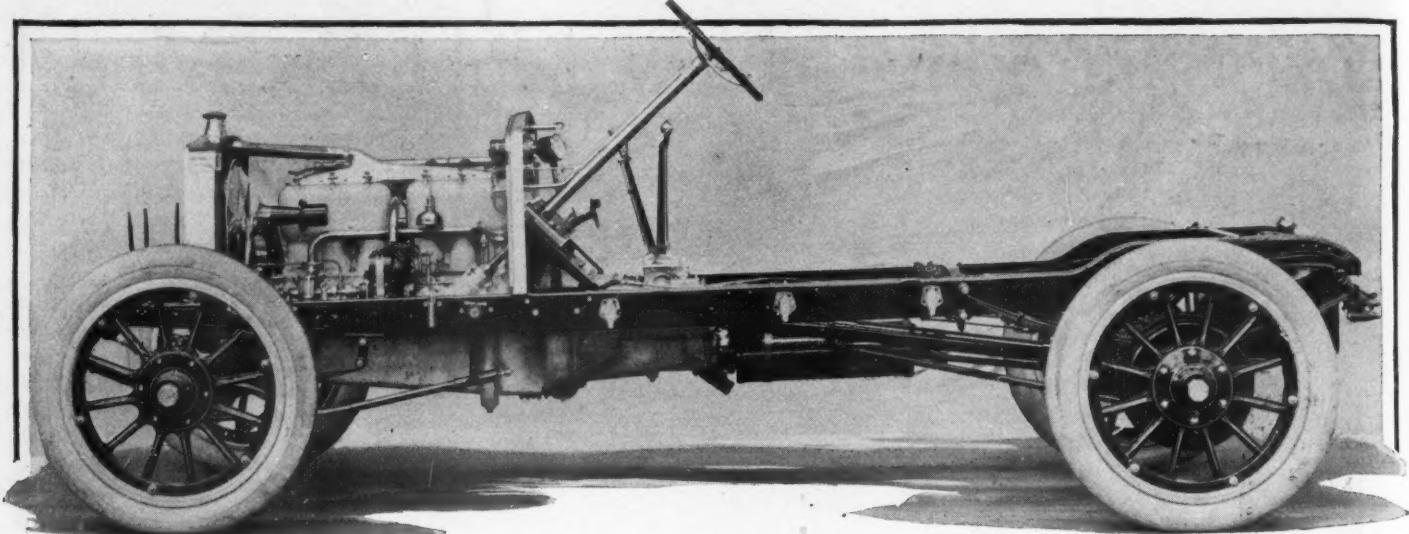
Cylinders are bolted to a rectangular base of aluminum which forms the upper half of the crankcase and which fills up the entire space between the motor and the side frame members, affording a mounting for magneto, lighting generator, etc. The bottom view of the chassis brings this feature out clearly and it also shows how the lower half of the crankcase bolts to this combined pan and motor support.

A combination force-feed-splash-gravity system of lubrication is used. A gear-driven oil pump, located in the rear of the engine base, forces the oil from the oil sump to the main crankshaft bearings, the main lead from this pump passing to a dash gauge and thence to the leads which run to the crankshaft bearings, the surplus oil flowing by gravity down into the individual troughs under the connecting rods.

The caps of the connecting rods are provided with small dippers which plunge into these troughs as they revolve, splashing the lubricant in the conventional way up into the cylinders, lubricating the con-



TOP VIEW OF NEW LOZIER LIGHT SIX CHASSIS



SIDE VIEW OF CHASSIS OF SMALLER SIX-CYLINDER MODEL

necting rod bearings, piston and cylinder walls. The overflow from the troughs finds its way into the lower part of the crank-case, which slopes to the rear, forming a reservoir. In thus flowing back the oil is drained through a series of fine mesh screens, so that when it reaches the reservoir it is sufficiently pure for recirculation by the pump.

Economical of Oil

Leads from the main oil passage beyond the sight feed also carry the lubricant to the camshaft bearings, magneto, pump, and front end gears. It is stated that a gallon of oil is sufficient to cover from 400 to 450 miles under ordinary conditions.

A centrifugal pump circulates the cooling water. It is located at the left side of the motor on the same shaft as the magneto and near the front, as shown in the illustration. The radiator is of the horizontal, square tube type, the tubes being $3\frac{1}{2}$ inches deep. The cooling fan has a diameter of 18 inches, and located conventionally between cylinders and radiator, is driven by a canvas belt $\frac{1}{4}$ inch in width.

Bosch high-tension magneto and storage battery are combined in a dual ignition system. One set of spark plugs is used, being inserted in the valve chamber plugs directly over the inlet valves. The magneto is placed on the left side of the en-

gine base just back of the pump. Its shaft is driven by an extension of the pump shaft to which it is connected by a coupling.

The gasoline tank is suspended at the rear of the frame, so located as to be effectually protected against damage due to contact with any object in the rear. The rear member of the platform springs protects it. The capacity is 20 gallons and fuel is fed from the tank by pressure, the air being supplied automatically by a positive plunger pump arranged in one of the valve-lifters. As this lifter is raised by the cam, air is drawn through a ball check valve and into a small cylinder or compression space below the lifter. When this lifter descends, the air thus trapped is compressed and sent through another check valve into a tube communicating with the gasoline tank.

The pressure is regulated by a blow-off valve at the top of the check valve mechanism on the side of the lifter. A hand pump on the foot board of the car is provided for increasing the air pressure should it get too low or become exhausted, in such cases, for instance, as the removal of the filler cap for the replenishing of the gasoline supply. A gauge on the dash indicates the pressure in the tank, while another gauge also fitted to the tank shows the amount of fuel contained.

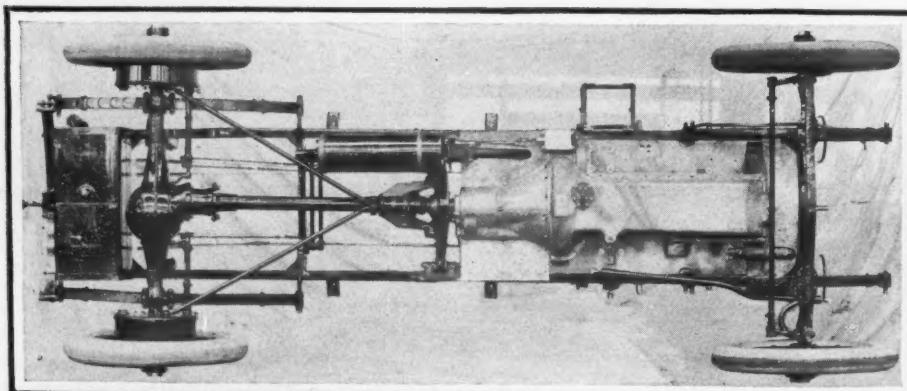
A Gray & Davis electric starting and lighting system is designed especially for this car and inbuilt as an integral part. It is entirely independent of the ignition system. The lighting generator and the motor which is used for starting are entirely separate units, both being located on the right side of the engine, as shown in the illustration.

The generator is placed just back of the fan driving pulley and is gear-driven by means of an extension of the fan driving shaft. When the engine is running at a normal speed the generator comes into action, charging the storage battery, from which the electric energy is drawn by the starting motor and by the lights.

New Battery Position

This storage battery is carried at the left outside of the frame, just forward of the fly-wheel position, and in a bracket seen in the chassis illustrations. When the car body and fenders are in place it is concealed. The generator produces about 12 amperes per hour when the car is traveling at a speed of 15 miles an hour. This speed is about that maintained in ordinary city driving and is sufficient to keep the battery fully charged at all times. The battery has a capacity of 120 ampere hours and its voltage is six.

On performing its starting duty, the starting motor gear meshes with teeth cut in the periphery of the fly-wheel. A starter pedal located in the floor board when pressed permits a small amount of current to pass through the armature of the starting motor, turning it very slowly and at the same time connecting the motor gear with the fly-wheel. When the starter pedal has been pressed down to its extreme position a switch is thrown, thus sending the full current from the battery to the electric motor, turning the crank-shaft over at about 100 revolutions a minute. When the engine starts under its own power and the starter pedal is released, springs slide the starter pinion out of mesh and break the electrical connection between storage battery and motor. As a safety feature the starting motor



BOTTOM VIEW OF NEW 1913 LOZIER, SHOWING CLOSED ENGINE BASE

driving gear is fitted with a free-wheel clutch which slips when the engine begins to pick up speed, preventing the armature from revolving and thus damaging the electric motor.

Alternate plates of the multiple-disk clutch are fitted with cork inserts. As the power plant is of the unit construction, the disks are entirely incased in the flywheel and run in a bath of oil, the whole being inclosed in an integral extension of the crankcase. To this flywheel and clutch housing the gearcase bolts. The gearset is selective, three speeds forward and reverse, direct on third. Following is the reduction for the different speeds: First, 9.97 to 1; second, 6.07 to 1; third, 3.75 to 1.

New Torsion Member

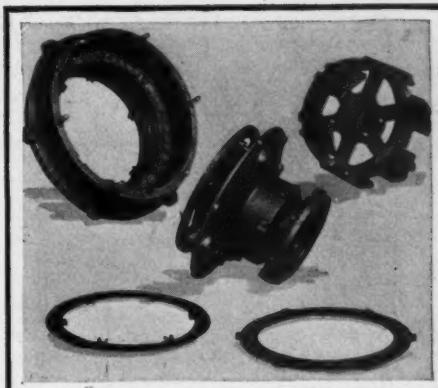
The propeller shaft is entirely inclosed in a torsion tube, as in former Lozier construction. The front end of the torsion tube bolts to a cross member of the frame through a substantial spider. A new feature of this construction is the swiveling of this crosspiece at either end where it

and a platform system in the rear. Each rear spring is half-elliptic, the two side springs being mounted outside the frame. All springs are provided with grease cups at their joints.

Brakes are all internal expanding, 16 inches in diameter, the two brakes, foot and emergency, are placed side by side and operate on the same drum. The shoes are faced with a combination woven wire and asbestos band $\frac{1}{4}$ inch thick. The brakes are adjusted by specially designed turnbuckles on the brake rods.

Wheels are of the artillery type and are provided with twelve spokes each. They are fitted with demountable and quick detachable rims, carrying 35 by $4\frac{1}{2}$ -inch tires all around.

The steering wheel is placed on the left, while the brake and change-gear lever are in the center. The steering wheel has a hard rubber corrugated rim with spark and throttle lever arranged on a quadrant at the center. The car requires a circle 38 feet in diameter in which to turn.



PARTS OF LOZIER DRY-DISK CLUTCH

fully-enclosed limousine, the Coronado six-passenger, semi-fore-door limousine, and the Touraine three-passenger coupe. These are all of the stream-line design and present a very distinctive appearance.

The Metropolitan inclosed car is constructed on the owner-driver plan, there being but one compartment with four seats all facing forward. The design is intended for the man who wishes to pilot his own machine in winter. The Coronado model has two front seats open for the footman and chauffeur, and in the rear compartment, in addition to the rear seat, has an extra seat which opens down from the rear of the front seat and which faces to the side.

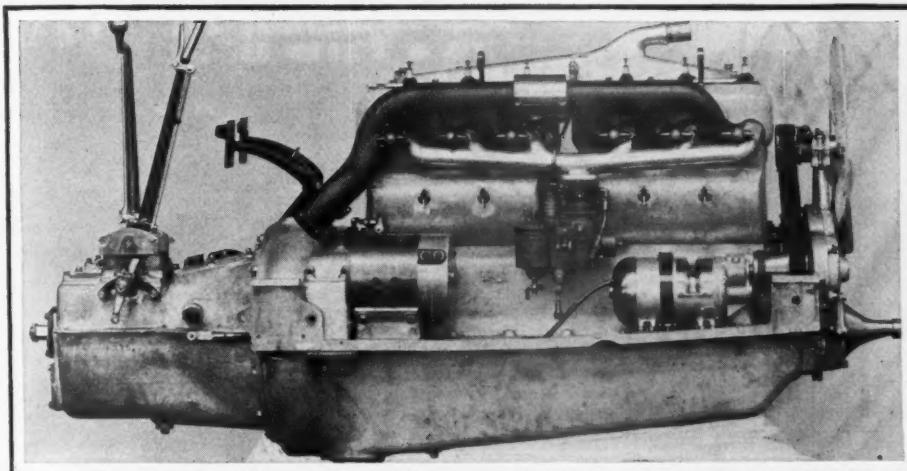
New Body Types

All limousine models are fitted with folding Pullman lights in the corners as a special feature. The Touraine coupe model is provided with a special auxiliary seat also, which, when folded down, faces the rear of the car. The right seat next to the driver is set back somewhat from the driver's seat so that when the car is carrying full complement of passengers there is plenty of room for all three. A spare tire is carried on the car's rear deck, while a compartment under the deck affords room for a number of things.

The Fairmount runabout has most attractive lines and is provided with an auxiliary seat on the running board for an extra passenger or for the chauffeur. The Montclair touring car has seating capacity for five and though exceptional in its seating arrangement, carries out modern body design in all respects.

Running boards are entirely clear, the spare tires being carried in the rear, while tool boxes are fitted in specially designed aluminum compartments in the aprons between the running boards and the frames. The windshield in the open models is specially designed for the car and forms a part of the body. Electric side and head lamps are of the bullet type, while the rear lamp is tubular in shape and illuminates the license plate, the bracket of which is attached to the lamp bracket. The equipment is complete in all respects.

Another special feature is the use of an all-metal dash on which the dash fittings are mounted.



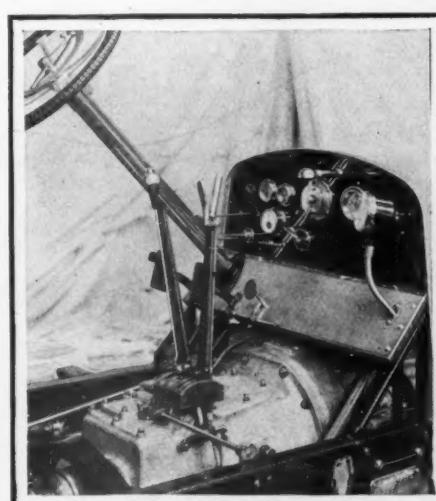
COMPACT CHARACTER OF CRANKCASE LOZIER LIGHT SIX MOTOR

joins the side rails of the frame. This freedom of movement allows for differences in the distance between the frame and the rear axle, to the housing of which the torsion tube bolts through a flange.

Unevenness of road surface, raising one wheel higher than the other and thus bringing the rear axle out of its normal plane, is allowed through a free connection at the rear of the spider where it joins the torque tube proper. This construction replaces the ordinary mounting of the torque tube spider in swivel joints connecting with a stationary crosspiece. The tube is braced by rods which run diagonally from its front end to the axle.

Floating Rear Axle

The rear axle is floating, the driving shafts being squared on the ends and fitting into square sockets in the differential gears. The front axle is a drop forging of I-beam construction. The road clearance under the front axle, which is the minimum of the chassis, is $9\frac{1}{2}$ inches. Former spring suspension obtains on the new six, in that half-elliptics are used in front



CENTER CONTROL AND COMPACT UNIT CONSTRUCTION OF CLUTCH AND GEARSET ON NEW LOZIER MODEL

The Motor Car Repair Shop

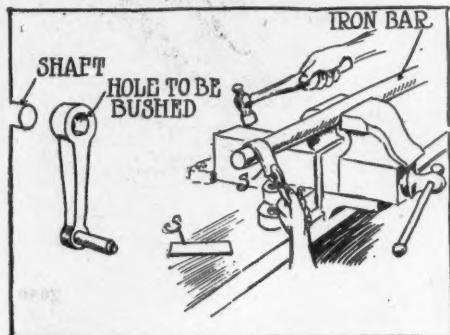


FIG. 1—METHOD OF REBUSHING STARTING CRANK

Effective Differential Reinforcement

IN Fig 2 is shown a means whereby a certain taxicab company has succeeded in greatly reducing the noisiness of the differential mechanisms of its cars, and at the same time gained an increase in the life of the differential mechanisms that cuts down the expense of upkeep to no slight extent. The differential gear as indicated in the illustration is of the spur-gear type with the squared ends of the driving shafts resting in square holes in the large central gears. It was found that after the gears of the differential mechanism became worn to a certain extent they would become noisy, and that when dis-assembled the central gears of the differential could be moved in an eccentric fashion because of the lost motion. Therefore, to steady the operation of the large differential gears a spider was fitted between the two halves of the casing as indicated. This contained in its center a bearing for the support of both the inner hub ends of the large differential gears.

The spider is made of iron forged into shape and its central bearing portion is lined with a bronze bushing. The legs of the spider leaving the center at angles of 120 degrees, pass between the three pairs of small differential pinions very nicely, and by cutting a little metal away from the inner sides of the large differential gears a generous bearing surface on the extensions of the inner hubs is obtained without weakening the large gears to any appreciable extent.

Rebrushing a Starting Crank

Though it is rather an unusual thing to find the starting crank of a motor car loose on the shaft, the repair of this nature seen in a London repair shop is applicable to so many other parts of the motor car that a description of it may be of value to other repairmen, especially to those who still have something to learn. The starting crank in this case was secured to the shaft with a tapered pin, and having worn loose the pin was removed; the starting-crank end bored out

Reinforcing Differential

to true it up and allow for the insertion of a bushing, and then a brass bushing sweated into it so that a tight fit on the shaft could be obtained. Unless the big end of a crankarm is a snug fit on a shaft the tapered pin used to secure it thereto will soon wear and become loose in service; it is quite necessary, therefore, that the crankarm be a fairly tight driving or press fit on the shaft before the pin is fitted.

In refitting the starting crankarm in this case, the hole in the arm was bored out nearly $\frac{1}{8}$ -inch larger in diameter. A strip of brass S Fig. 1 about 1-16-inch thick was then cut to fit as a lining into the hole in the crankarm. In approximating the size of this strip, the width was obtained from the width of the crankarm; the length was obtained by multiplying the diameter of the hole by 3 1-6; the latter figure being the nearest simple fraction for 3.1416, which if multiplied by the diameter of any circle will give the circumference of that circle. Thus the approximate length of the brass lining was obtained. The lining then was cut from a sheet of brass, and tinned on both sides. The tinning process consisted in heating the brass strip then swabbing it with soldering acid and applying a coat of tin or solder with a soldering iron. In doing this, as soon as the tin has flowed over the entire surfaces, the superfluous solder should be wiped off with a bundle of thin paper on a dry cloth.

The next operation is to bend the strip

of brass into the form of a cylinder and fit it into the hole in the crankarm. To bend it into cylindrical form, a piece of iron rod or piping or the end of the starting-crankshaft if convenient, is used as a mandrel and secured in the vice; the strip of brass is then bent as nearly as possible into shape with the fingers and finished up with a hammer as indicated in the illustration. Having obtained the cylindrical form, it may be found a trifle too large for the hole in the crank arm, but this is easily remedied by cutting a little off the end of the strip.

The next step is to apply a coat of tin to the inside of the crankarm, which is done by heating it a trifle, swabbing the inner surface with acid, and then applying the solder with an iron as described above. As soon as the crankarm has been tinned the brass bushing is started into the hole in the crankarm while still warm; the end of the crankarm is then held over the flame of the iron oven or torch until the solder begins to flow, when it will be found that the bushing can be easily pushed or tapped into place. To finish up the job neatly, the protruding edges of the brass bushing are filed flush, swabbed with acid and soldered smooth.

Care of Tool Handles

Careful workmen will take quite as much care of the handles of their tools as they do of the working portions. Air and water quickly ruin a hammer or chisel handle, if not provided against. Dry, hot air will dry them out and water will warp and rot them. The handles as well as the heads or blades of tools should be rubbed with oily waste.

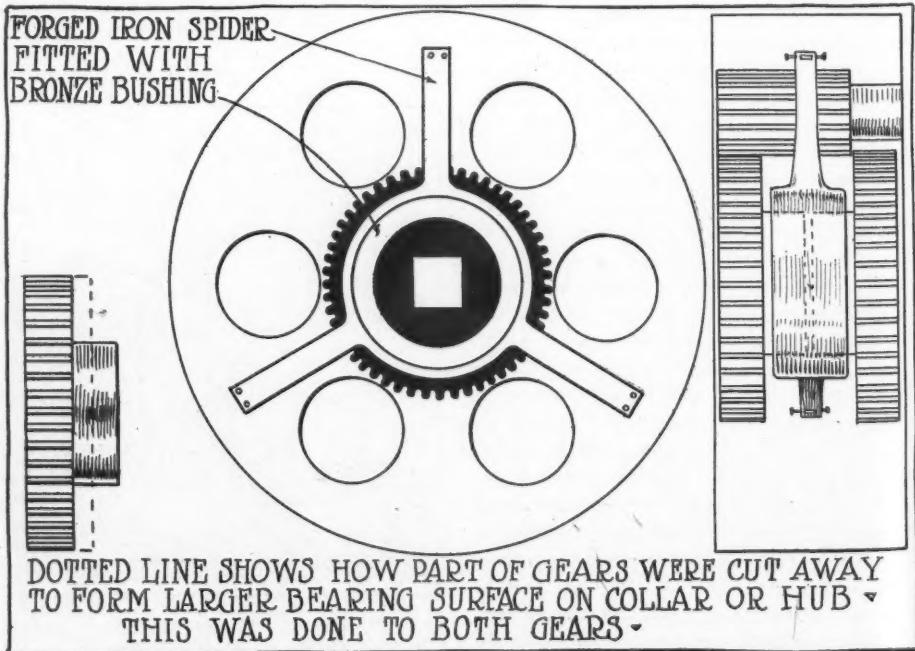
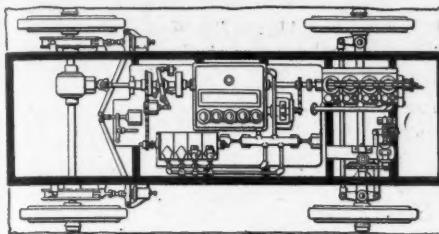


FIG. 2—STEPS IN REINFORCEMENT OF SPUR GEAR DIFFERENTIAL



Current Motor Car Patents



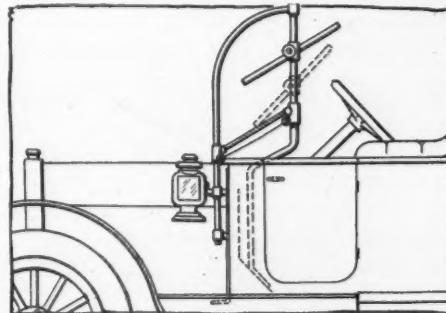
SUNDH GEAR CHANGE

COMBINED Motor Car and Motor Boat—No. 1,047,271—To Hartley A. Mitchell, Newport News, Va. Filed November 13, 1911, dated December 17, 1912. A vehicle capable of travel on either land or water, this invention consists of a motor boat, fitted with an engine and propeller wheel, to which is secured a pair of axles and detachable wheels, which are connected to the boat by springs. A hoisting device within the boat is used to raise the wheels and axle sections into the boat. This device is arranged to turn the axles end for end in the act of raising them, and to reverse them back to their normal disposition, in lowering them again. The patent does not refer to any detail, nor does it specify the reasons for the reversal of the axles in raising them. In use, the vehicle would be run upon its wheels on land, driving and steering in the usual manner. Upon reaching water, it would be run upon its wheels, into the water, until it floated, clear of its wheels, when the latter would be lifted and deposited within the boat, by the manipulation of the hoisting device.

Windshield—No. 4,047,817—To Frank Knight, New Haven, Conn. Filed December 12, 1911, dated December 17, 1912. This windshield is of the single pane type, comprising a vertical standard with a curved stay-rod secured to its upper end, and to the body of the car, in front of the fastening of the vertical standard. Between the two members is an inclined apron, entirely below the line of vision of the driver. This apron is supported by cross members. The pane is secured to the vertical standard at about its center, the means whereby it is secured being a sliding block and friction pivot, which permits the pane to be revolved upon the pivot and locked at any angle, and to be elevated or lowered by means of the sliding block and locked in any position vertically.

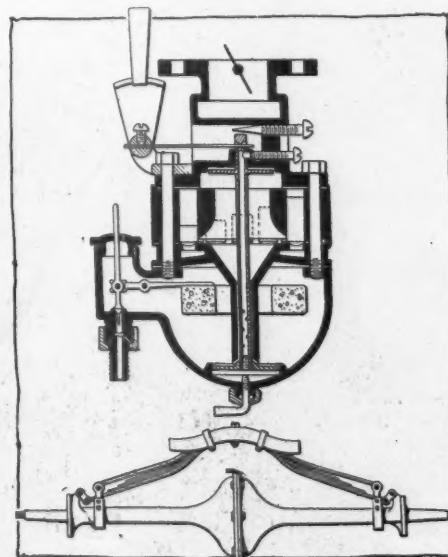
Speed-Regulating Carburetor—No. 1,047,595—To John F. Twigg, San Francisco, Cal. Filed November 8, 1909, dated December 17, 1912. A new principle of vaporization is involved in the carburetor referred to in this patent. The carburetor is of the float-feed type, having a mixing chamber above it. The bottom of the

mixing chamber, which constitutes the cover of the float chamber, in the form of a funnel, terminates in a tube and extends down into the fluid in the float chamber. Within this tube is a small spaced one, which extends upward to an adjustable opening to the atmosphere, and downward to a closed end at the bottom of the float chamber. At this lower end the tube is perforated to allow air to pass from it to the gasoline in the outer tube, which surrounds it. The inner air tube is secured integrally to a dash-pot piston in a short cylinder at the bottom of the float chamber, which acts as a valve between the outer tube and the float chamber, regulating the amount of fluid to be admitted to the space between the tubes. The suction in the mixing chamber draws the air in the central tube down through

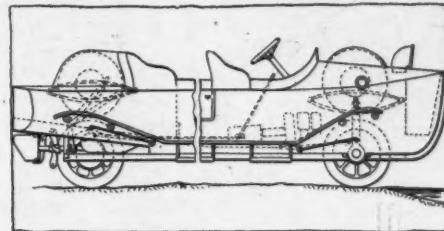


KNIGHT WINDSHIELD

the gasoline and up through the tube, entering the mixing chamber as a gasoline vapor. The mixing chamber is a gasoline vapor. The mixing chamber is provided with a series of surrounding auxiliary air valves whose passages are of different lengths. Adjustments are provided for the stroke of the central air



TWIGG CARBURETOR AND YATES SHOCK ABSORBER



MITCHELL AMPHIBIOUS VEHICLE

tube, to regulate the proportion of gasoline and air delivered by the outer tube to the mixing chamber.

Ford Shock Absorber—No. 1,047,477—To Gideon D. Yates, Lisle, N. Y. Filed July 13, 1912, dated December 17, 1912. As a shock absorber for cars having transverse half-elliptic springs, in which the center is secured to the frame, and the ends to the axle, this patent refers to a flat spring, secured to the center of the vehicle spring, and fastened at its ends to adjustable shackles secured to the axle housing. The action of this spring is in the reverse direction to that of the vehicle spring, so that it exerts no resistance to the flexure of the spring, but resists its rebound. The adjustment permits of regulation of the degree of resistance offered.

Electrically Controlled Change-Gear—No. 1,047,329—To August Sundh, Yonkers, N. Y., assignor to Otis Elevator Co., Jersey City, N. J. Filed March 6, 1909, dated December 17, 1912. In reference to a hydraulic change-gear, this patent relates to an electric control mechanism, to govern the effect of the effort on the part of the driving element upon the driven element. The particular type of change-gear employed consists of a fluid pump, driven by the engine, which induces a flow of fluid from itself to a hydraulic motor, which in turn exhausts the fluid through a passage leading to the non-pressure side of the pump. On the motor is a slide-valve designed to vary the extent of surface exposed to the stream of fluid from the pump. The object of this function is to vary the proportionate speed of the motor to the pump, by forcing the flow of fluid from the pump, which may be assumed as constant, to pass through a small volume of the motor, thus driving it at high speed, or to spread out over a large volume, thus driving slowly. This slide-valve is electro-magnetically controlled, the control also governing a bypass which allows the fluid to pass from the pressure side to the non-pressure side of the pump, without going through the motor, thus providing a neutral position.

The electromagnetic control would be operated by a suitable control at the driver's seat, or by an automatic governor.



The Realm of The Commercial Car



Motor Passenger Service in Porto Rico

Transportation Problem on Island Partly Settled by Gasoline Vehicles—More Than 170 Rigs Now Operating, Not Counting About 800 Touring Cars—Several Lines Now in Operation Which Are Proving Financial Successes



MAP OF PORTO RICO, SHOWING EXTENSIVE SYSTEM OF MACADAMIZED MOTOR ROADS

MOTOR vehicles, ranging from small touring cars to 5-ton trucks with converted bodies that will seat thirty people, are playing a big part in the passenger transportation problem in Porto Rico.

Probably nowhere else in the world have good roads made possible such a rapid development of motor traffic as in this island. With but two railroads that really have a passenger service, and serving only a small section of the island, the motor car has taken the place of the locomotive and by motor every section of the island is made accessible.

Railroad Service

From San Juan to Ponce, the two principal cities of Porto Rico, there is a railroad. This road runs around the west coast connecting with all the important cities of that section. From San Juan another railroad runs into the interior to Caguas, 36

kilometers away, and on the military road toward Ponce. This is the only inland railroad on the island. There are other

short railroads, most of them starting in the yards of some sugar central and ending in the cane fields. Some of them

maintain a passenger service of a sort, but none of them can be reckoned with if one expects to get from place to place with either speed or comfort. For such travel the motor car must be used.

Use of Motor Universal

From almost any station on the American Railroad a motor car may be taken to any point in the nearby interior. It only has been a few years since all this overland travel was done with coach and ponies. But in the past 5 years the motor has come into more general use and now these coaches and ponies are confined almost entirely to city and local travel.

In their place there are now 170 public passenger motor cars to say nothing of the 800 private cars. The Atlas line was the first organization to enter



MOTOR BUS SHOWING HOW BAGGAGE IS CARRIED

the field with motor passenger service and this company runs a string of touring cars between San Juan and Ponce and other points. Generally there is a car of this line each way between San Juan and Ponce daily. Each car will carry four or seven passengers and their hand baggage.

Good Bus Service

From Rio Piedras, which may be reached by trolley from San Juan, there is a regular motor bus service to Carolina and Mameyes and from Mameyes the trip on around the east coast may be continued by touring cars.

From Aguadilla on the west coast, there is a touring car that meets every train and carries the mail and passengers up to Lares, in the heart of the coffee country. From Ponce one may get a machine to Guayama or Humacao, and there is a motor bus service between Cataño, across the bay from San Juan, to Bayamon, a short distance inland.

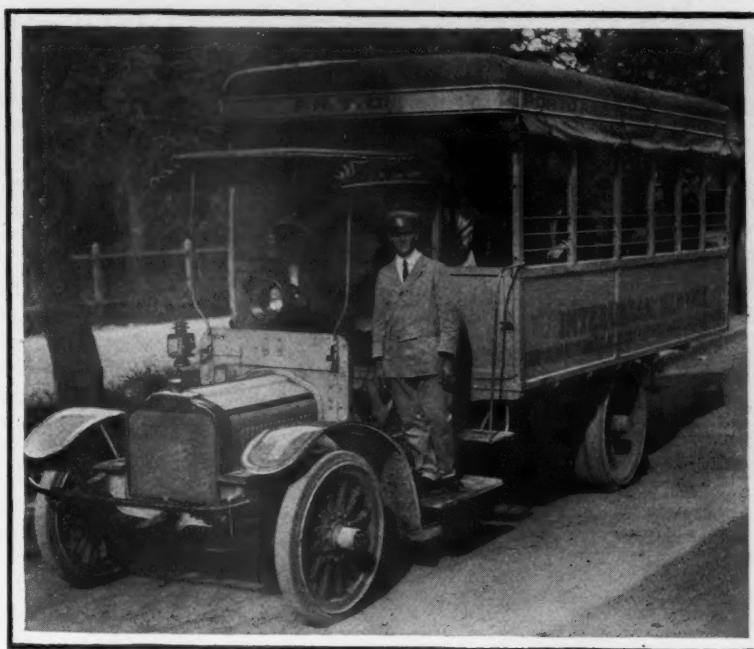
Novel Passenger Service

But the most novel motor passenger service has been established recently by the Porto Rico Transportation Co., with the use of two Saurer trucks. This company is a branch of the Porto Rico Motor Co., but is separately owned and operated. On September 1, this company started a daily bus service between San Juan, Ponce and intermediate points. A car leaves Ponce and another one starts from San Juan each morning.

New bodies were built for these two passenger trucks and the arrangement is something like that of a street car. There is a row of double seats along each side

of the car, with an aisle in the middle. The front of the car is partitioned off, leaving room for two long seats that extend practically the full width of the car. These are the reserved seats, or parlor car section. There is room for four or five on each of these long seats.

The bus is entered by steps in the rear. There is an exit through the front of the car by steps leading down past the driver's platform. Besides the driver there is a conductor who collects fares and sees that passengers get off at their right stops. There is an electric signal connecting the back of the car with the driver's seat by which the conductor may signal to the driver. The reserved seats are upholstered in leather while the other seats have pads of canvas, much like those used in army wagons.



SAURER TRUCK CONVERTED FOR PASSENGER SERVICE

On the rear of the bus what corresponds to the end gate has been converted into two shelves, one on each side of the entrance steps, and baggage may be piled and tied on these shelves.

The biggest passenger load either of these buses has carried so far is thirty-three people, while they have had as many as ten trunks to carry. Provision also is made for an express service.

These trucks are operated on a strict schedule. South bound, for Ponce, the bus leaves the San Juan plaza at 8 o'clock each morning. Taking the military road the bus passes through Rio Piedras, Caguas, Cayey, Aibonito, Coamo, Juana Diaz and then into Ponce

at 4:15. A stop is made at each of these places, while there are flag stations. Ticket offices are maintained in San Juan, Caguas and Ponce. Messages may be gotten to the buses by telephone to any town through which they pass.

Makes Interesting Trip

The schedule calls for an 8-hour run. Thirty minutes is allowed for lunch at Cayey, where the buses pass. With the other stops the actual running time is about 7 hours. This necessitates a speed of 15 miles an hour on level road and 9

FARE BETWEEN POINTS		PONCE										RIO CUYON, K. M. 108.5.		RIO CUYON, K. M. 94.5.		AIBONITO.		CAYEY.		LAS CRUCES.		CAGUAS.		LA MUDA.		RIO PIEDRAS.	
		JUANA DIAZ.		RIO CUYON, K. M. 108.5.		COAMO		RIO CUYON, K. M. 94.5.		AIBONITO.		CAYEY.		LAS CRUCES.		CAGUAS.		LA MUDA.		RIO PIEDRAS.							
SAN JUAN.....		5.00	4.50	4.25	4.00	3.50	3.00	2.60	2.00	1.75	1.00	0.75	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50			
RIO PIEDRAS.....		6.50	6.00	5.75	5.25	4.75	4.00	3.60	2.75	2.50	1.50	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
La Muda.....		4.50	4.00	3.75	3.50	3.00	2.50	2.00	1.50	1.25	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50			
CAGUAS.....		4.25	3.75	3.50	3.25	2.50	2.25	2.00	1.25	0.75	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50			
Las Cruces.....		4.00	3.50	3.25	3.00	2.00	1.50	1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50			
CAYEY.....		3.00	2.50	2.25	2.00	1.50	1.00	0.60	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25			
Barrio Maton, K. M. 67.5.....		2.50	2.00	1.75	1.50	1.00	0.60	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25			
AIBONITO.....		2.00	1.50	1.25	1.00	0.60	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25			
Rio Cuyon, K. M. 94.5.....		1.75	1.25	1.00	0.60	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25			
COAMO.....		1.00	0.75	0.50	0.50	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25			
Barrio Rio Cañas, K. M. 108.5.....		0.75	0.50	0.50	0.50	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25			
JUANA DIAZ.....		0.50	0.75	0.75	0.75	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25			

El pasaje es el mismo en cualquiera dirección.
Los billetes de pasaje, incluyendo asiento especial, figuran en tipo corriente.
Para averiguar el precio del pasaje entre dos puntos, búsquese el nombre de uno de ellos en una columna del margen y el otro en la columna del otro margen, y en el punto de intersección de las dos líneas, se hallará el precio que se desea.

RATE CARD ISSUED BY PORTO RICO TRANSPORTATION CO.

Form A 1.		Porto Rico Transportation Company			
		San Juan—Auto-bus Service—Ponce			
		Pasajeros — Equipajes — Express			
TIME SCHEDULE					
ITINERARIO					
SOUTH BOUND					
Kms. Lv.	San Juan (Plaza Principal)	Ar.	M. A. M.		
12 "	Rio Piedras		8.00		
36 "	Caguas		8.50		
61 Ar.	Cayey		10.10		
80 "	Aibonito		11.45		
98 "	Coamo		12.15		
118 Ar.	Juana Diaz		P. M.		
130 Ar.	Ponce		1.25		
			2.25		
			3.30		
			4.15		
NORTH BOUND					
Kms. Lv.	Ponce (Plaza Principal)	Ar.	A. M.		
12 "	Juana Diaz		7.30		
32 "	Coamo		8.10		
50 "	Aibonito		9.15		
69 Ar.	Cayey		10.30		
94 "	Caguas		11.35		
118 "	Rio Piedras		P. M.		
130 Ar.	San Juan		12.05		
			1.30		
			2.45		
			3.30		
Stops will be made en signo to take on or discharge passengers at:					
Se harán paradas para subir o bajar pasajeros en los siguientes puntos:					
Stop 6, Hotel "Europe", Hotel "Nava", Stop 17 and Stop 23					
(in San Juan) and at Martin Peña, La Muda, Para Cochero, Las Cruces, Barrio Maton (Km. 67.5), Barranquitas Road (Km. 84), Rio Cuyon (Km. 94.5), Barrio Rio Cañas (Km. 108.5) and at the Ponce Market.					
The time given above is the time at which the buses are expected to depart and arrive, but the time of departure or arrival is not guaranteed, nor will the company be liable for any failure to so depart or arrive.					
El tiempo indicado arriba es el que se permite para salir y llegar los camiones, pero las salidas y llegadas de éstos no se garantizan, ni la compañía se hace responsable de cualquier accidente que pueda entorpecer las horas del itinerario.					
C. J. SCHELLINGS					
GENERAL SUPERINTENDENT					
SEPT. 1ST. 1912.					



KNOX BUS USED IN PORTO RICO TRANSPORTATION SERVICE

miles on the hills. Starting at Ponce the bus leaves at 7:30 and reaches San Juan at 3:30. The distance traveled is 130 kilometers, or about 80 miles.

The fare between San Juan and Ponce is \$5. A reserved seat costs \$1.50 more, or \$6.50. The prices are less to intermediate points and passengers are picked up and discharged at designated points all along the route.

To an extent this bus service is run in opposition to both the railroad connecting San Juan and Ponce and with the Caguas tramway. The fare on the tramway to Caguas is 90 cents. On the bus the fare is \$1 or \$1.50 with a seat in the parlor section. The railroad fare to Ponce, including parlor car, is about \$8, while with the best seats in the bus the fare is \$6.50, or \$1.50 less. The railroad trip between Ponce and San Juan takes from 9 to 13 hours. For points between Caguas and Ponce on the military road there is no railroad competition with the passenger bus.

Growth of the Business

When the Porto Rico Motor Co. started operations last May it was for the special purpose of entering the freight transportation field. The passenger service at that time had not been considered, or at least seriously. The Atlas line and many independent car owners were then operating between San Juan and Ponce and to any other points where there was a demand for passenger service.

By the Atlas line the fare between San Juan and Ponce generally is \$10 a passenger, four passengers to a car. If fewer than four passengers make the trip the entire fare, \$40, is divided among them. The trip generally takes 5 hours.

After looking over the field officials of the Porto Rico Motor Co. decided to organize a separate company to enter the passenger service. The Porto Rico Transportation Co. is the result. It has but a nominal capitalization and rents its cars from the motor company. Its service so far has been considered most satisfactory both from the company's standpoint and

that of the passengers. A similar service will be established in other sections of the island when the demand for it develops. The Atlas line also has arranged to extend its service.

These are the two chief passenger lines operated by motor. However, there is a twelve-passenger Gramm car that makes the trip back and forth between Arecibo and Utuado daily. On the lines between Rio Piedras and Carolina and Mameyes a White omnibus and a Rapid bus are used. With these exceptions, and the two Saurer trucks, other motors in the passenger service are of the touring car type.

GOOD ON LONG HAULS

For the past 7 or 8 months, C. J. Ayers & Son, Hartford, Conn., have utilized a 5-ton Pierce-Arrow motor truck for long hauls and so well are the owners pleased with their initial installation that another car will be purchased in the spring.

The Ayers Pierce-Arrow truck is used principally for long hauls delivering bottled soda throughout the state of Connecticut. New and profitable business has been built up in towns 40 miles from Hartford in fact, the era of expansion marks invasion of Massachusetts territory as well. Now the Ayers truck makes trips to Springfield, 26 miles distant from Hartford, to Holyoke, Northampton, Lud-

low, Chicopee and Chicopee Falls. The car has served interested prospective purchasers of motor trucks with an actual demonstration of long-haul ability.

The head of the firm states that business since the installation of the Pierce has been practically tripled, in fact, territory now covered could not under other than truck delivery be considered at all. The total expense for 100 miles of operation, that is say, a run to New Haven and back the same day, making 104 stops, transporting 172 cases of soda, weighing nearly 5 tons, and collecting empties and getting them back to Hartford the same day, is approximately \$24, this including all items of expense and allowing a liberal margin on many just to be on the safe side.

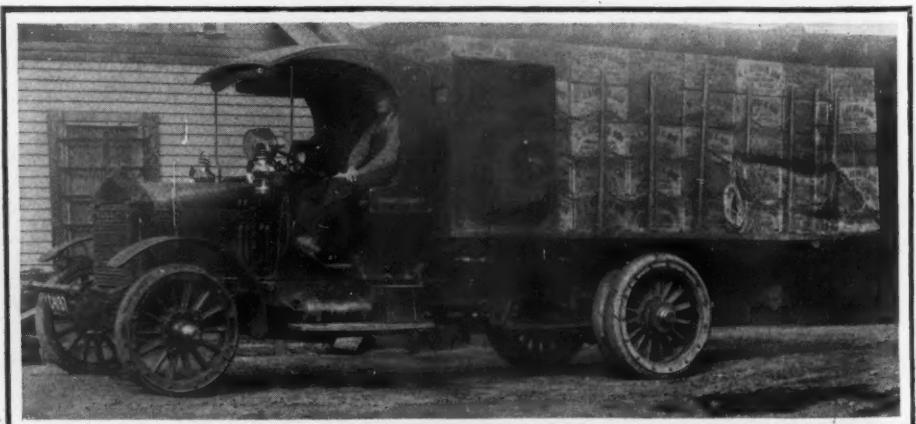
To deliver bottled soda by freight, to include all charges as delivery at destination costs \$33.54, express nearly double, so that the truck on this one trip alone effects a saving for the owners of 26 per cent.

SOLVES TRUCK PROBLEM

San Francisco has an interesting problem in connection with the motorization of its hauling, and an enterprising local agent believes he has solved the question. Frisco, and, fact, the entire state of California, always has used what is termed a low-bed truck. The bed of the vehicle is hardly a foot from the ground. This makes it possible to load heavy objects directly from the street or sidewalk, and in the absence of loading platforms it is difficult to persuade teamsters to take kindly to any other type. Now President S. M. Crim of the Knox agency has figured it out that these trucks can be drawn by the Knox-Martin tractor. He has arranged for the construction of a number of the latter so that their rear wheels will serve as the front wheels of the low-bed truck.

PLAN MAIL MOTOR ROUTE

In the promotion of a plan for the establishment of a daily mail motor car service between Carrizozo and Roswell, N. M., a mass meeting recently was held in which resolutions indorsing the proposition were adopted. Postmaster A. H. Rockafellow of Roswell was present and



PIERCE-ARROW WHICH IS RUNNING FOR HARTFORD BOTTLING CONCERN

outlined in a general way the advantages of the proposed arrangement, saying that one of its important features was that of placing Carrizozo on the line of the great Borderland across-the-continent motor route. Roswell already has definitely secured assurances for the route from Dodge City, Kan., to that point, and the route from Roswell, covering 103 miles, interested them very strongly as a link connecting them with El Paso and thence on to Phoenix, Ariz.

As a practical mail route it would possess great advantages, furnishing daily mail service to nearly 85 per cent of the population between Roswell and Carrizozo. It would reach and serve with daily mail nine postoffices, and from these mail would be distributed to nine more offices, making eighteen in all.

STRENUOUS NORTHWEST TRIP

To test the value of the motor truck as a means of transportation between the Twin cities and the head of the lakes, Duluth and Superior, the Twin City Motor Car Co. loaded a 5-ton Sauer truck with wholesale groceries. It consumed 24 hours in actual running time for the 190 miles. It used 30½ gallons of gasoline and 3½ gallons of oil. On the last leg of the run the engine did not stop for 129 miles.

The truck was laid up en route from Thursday night to Monday morning because in the deep snow, mud and snow a log chain broke from the wheel and caught between a drive chain and sprocket and broke a link. An order was sent to Chicago for a link and the train was wrecked.

Road conditions on the whole were bad, the wheels at times going in as far as the hubs, but the truck got out under its own power. The only expense was for gasoline, oil and the link. The load was 3 tons.

USED BY MILKMAN

An interesting demonstration in the economy and efficiency of a commercial truck for rural hauling is being made daily by Snow & Palmer, a dairy firm of Bloomington and McLean, Ill. The two cities are 18 miles apart. Until recently the firm was given reasonable rates for transporting milk by the steam road. When a new scale, much higher, was placed in



WHITE IN PORTO RICAN TRANSPORTATION SERVICE

effect, the firm decided to haul their own milk. A 3-ton Packard truck was purchased and now makes one and two round trips daily, carrying 2 to 3 tons on each trip. The ordinary running time each way is an hour and thirty to 1 hours and 45 minutes. It would require a team of draft horses with the same load from 5 to 6 hours to make the trip. So far this winter, the truck has not missed a trip, the roads being in excellent condition. In addition to the milk and cream handled, the firm adds to its income by hauling articles for the business men of McLean and always is sure of a full load on every trip.

PUMPS OUT CONDUITS

An interesting exhibition of the possibilities of the commercial motor car was given recently on Forty-second street, New York city. A Hatfield commercial car with express body and top was used. A hose leading from a rotary pump attached to the chassis of this vehicle extended down into the electric wire conduit underneath the ground and the car pumped out of the conduits the collection of water in them. This one Hatfield car with three men took the place of a team of horses and a pump in the wagon and a force of nine men to do the same amount of work. Three of these cars already are in active operation in this service, with the possibility of several more being added. The same motor that

drove the car to the different points of the city was disconnected by means of a clutch from the driving apparatus of the car, and thrown into the pumping plant, throwing a 4-inch stream.

TESTS BY LUMBER COMPANY

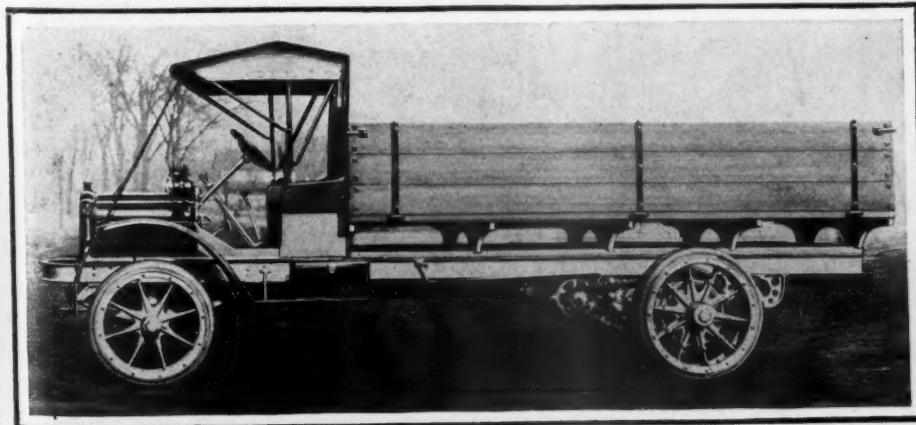
Four months of actual usage of a Pierce-Arrow truck by the Capitol City Lumber Co. of Hartford, Conn., which kept accurate record of the truck and also its teams has developed some surprising facts and figures. The computation in both cases is based on the total investment, insurance, interest, up-keep, repairs, etc. It has been demonstrated that the truck replaces five and one-half teams, and that the truck will deliver lumber at 36 cents per 1,000 cubic feet, while the teams cost 75 cents per 1,000 feet, or more than twice as much. The statistics are:

Pierce-Arrow Two-horse Team.		
Total investment — with equipment	\$ 5,362.12	\$ 1,510.00
Total expense per day	15.26	5.63
Average mileage per day	42.5	15.
Average round trip haul — miles	5.	5.
Average number trips per day	8.5	3.
Average load — dressed lumber	*5,000	*2,500
Average weight per load	†5.	†2.5
Carrying total per day	*42,000	*7,500
Total expense per 1,000 ft.	36c	75c
*Feet. †Tons.		

The truck is equipped with a roller body, and, as an accessory, a small four-wheel loading wagon for gathering lumber about the yards and having load ready for the truck. By actual timing it has been found that it takes 3 minutes to transfer the lumber on the truck, and 2 minutes to unload, without damage of any kind to the lumber.

BALTIMORE HAS MOTOR BANK

The first motor car bank to be established in Baltimore and vicinity went into service last Monday. This motor car bank is used by the German-American Bank of Baltimore and was put into service to enable the bank to accommodate its depositors in east and northeast Baltimore, Orangeville, Highlandtown, Canton and other sections of Baltimore county. The chassis is a Chalmers. The body of the car was built in Baltimore by the Leonhardt Wagon Mfg. Co.



WHITE TRUCK, TEN OF WHICH WERE BUILT FOR RUSSIAN GOVERNMENT

MAKE Adventurous Trip—To motor down the coast from Seattle to Mexico and return during the winter season in 33 days is the unusual accomplishment of Mr. and Mrs. C. L. Roy of Seattle. The outing covered 3,913 miles. A Packard was used.

South Dakota Registration—Application for motor car registration in South Dakota are: For 1912 the total was 3,908, and for the time the law has been in effect, 7 years, the total registration has been 15,212. The figures by years are: 1905, 357; 1906, 250; 1907, 314; 1908, 824; 1909, 2,104; 1910, 3,065; 1911, 3,390; 1912, 3,908.

Would Tax in Cincinnati—City Auditor Washburn of Cincinnati is preparing an ordinance to compel all car owners to pay a tax to the city. The scale fixed is as follows: For all 20-horsepower cars, \$10; 48-horsepower cars, \$15; 60-horsepower cars, \$20, and for all owners of garages and storing places for keeping machines, \$20. It also is planned to put a city tax on motor cycles.

Washington Trying Brick—Two and seven-eighths miles of roadway near Kent, Wash., a part of the Pacific highway, has recently been paved with brick, the first brick-paved highway west of the Rocky mountains. The total cost of the road has been \$58,000, or a little less than \$20,000 a mile. It is 17 feet wide, has a 5-inch concrete base, on top of which is a paving of vitrified brick and is finished with a cement grout surfacing.

South Dakota Wants Convict Labor—The South Dakota Good Roads Association will ask for a bill permitting working convicts on state roads, at a meeting called for this week at Rapid City. Other measures will be a bill for state aid for roads, and for appointment of a state road commissioner. A conservation meeting is to be held in January at Pierre and the good roads association will make roads a prominent feature. A legislative campaign will be mapped out at the Huron meeting.

Minnesota's Post Roads—Post roads have been indicated on a map of Minnesota by the state highway engineer, G. W. Cooley, at the request of Senator Bourne, up to 2 per cent of a total mileage. The roads are as follows: Winona to Luverne; Stillwater to Browns Valley, through the Twin Cities; Duluth to Grand Forks; St. Vincent to Ortonville; International Falls to Iowa boundary; Grand Rapids to the Twin Cities; Duluth to the Iowa line, through the Twin Cities.

Badgers Discuss Motor Tax—“Motor cars are evidence of either actual or pretended opulence,” says the annual report of the Wisconsin state tax commission in making recommendations of changes in the present tax laws to the legislature, which will convene in January. The problem of motor car taxation long has occupied the time of the commission, which is desirous of changing the method of taxation to better conform to theory, and the report says

From the

further: “Motor cars are the direct cause of public expense in the construction and maintenance of highways. They should be exempted from the personal property tax and in lieu thereof an annual license fee based upon weight or horsepower should be fixed.”

Alligators Travel in Style—Live alligators are being transported by motor car at New Orleans. The animals are bred in captivity on a farm near the city and are being shipped to different sections of the country in such numbers as to justify the building of a special body best adapted to handle the saurians alive.

Delaware Planning Big Time—The Delaware Automobile Association is planning for a monster state motor demonstration in Wilmington on January 13, on which date the association will hold a banquet in the Hotel duPont, which is now being completed at a cost of \$1,000,000. The banquet will be held for all motorists in the state.

Want Illinois State Road—Cities on the Chicago and Alton between Chicago and St. Louis are making the most active effort to secure one of the proposed state roads which the next legislature will probably authorize. As this is the shortest route between the two metropolitan cities, it is thought that it will receive favorable attention. The cities between Springfield and St. Louis have completed an organization and those between Bloomington and Chicago will shortly take similar action.

Novel House for Winnipeg Club—New country headquarters have been secured by the Winnipeg Automobile Club of Winnipeg, Man., in the old historic Lower Fort Garry, built by the Hudson Bay Co. as a trading post on the banks of the Red river in 1832. The club also will have an additional 80 acres of land adjoining the fort

which will be laid out as a golf links and on the river side a landing stage will be made for the convenience of such members who own a motor boat in addition to a car. The new quarters are situated about 18 miles from the city of Winnipeg in a direct line north.

Club Doing Good Work—The Decatur Automobile Club of Decatur, Ill., has expended \$600 since September for road dragging in adjacent townships where the highway commissioners have limited funds and it has been decided to expend \$300 additional. This will keep the roads dragged until February 1. The Decatur club has given especial attention to the Waubonsie trail through Macon county.

Would Extend State Road—Business men between Rockford and Glenwood on the Soo line in Minnesota have organized to extend the state road from Minneapolis to Glenwood through Rockford under the Elwell road law which distributes one-half the cost to the state, one-fourth to the county, and one-fourth to the property improved. E. Peck of Kimball Prairie is chairman and Will O'Brien of Eden Valley is secretary.

Motor Bills in Already—Two important bills relating to motor cars already have been filed for the incoming legislature in Massachusetts. Representative Greenwood of Everett has put them in. One of these provides that whenever a person is convicted of operating a motor car while under the influence of liquor he shall be imprisoned for not less than 30 days nor more than 1 year, and that his motor license shall be revoked for all time. Under the present statute the penalty for a first offense is a fine of not more than \$200 or imprisonment for not more than 6 months. The license is suspended by the highway

Old Roads Made New



POPLAR SPRINGS ROAD NEAR MERIDIAN, MISS., BEFORE IMPROVEMENT

Four Winds

commission, but it may be returned to the motorist later. The other bill will be of interest to makers of electric ignition with which so many cars are now equipped. This prohibits the operation of motor cars with a device by which the driver may shut off the tail light without leaving his seat.

Will Not Raise Speed Rates—The motorists of the province of Quebec will not be able to speed at any more rapid rate than they have hitherto done. Upon the protest of the member of the legislature and others, Mr. Mackenzie, promoter of the bill regarding the control of motor vehicles, decided to withdraw the clause increasing the speed limit from 9 to 15 miles in cities and villages, and from 15 to 25 miles in the country. The bill was read the third time.

Illinois Road Work—In the last year 42 miles of new hard road have been constructed in Illinois under the supervision of the state highway commission. In addition to this 20 miles have been improved and placed in first class condition. The total value of the road construction has been approximately \$250,000, which does not include an estimate of the value of the stone furnished by the state for the work. During the past year, the state commission has been engaged in a demonstration of maintenance of roads.

Many Long Island Trophies—Seven new trophies have already been offered for competition in the Long Island Automobile Club for the season of 1913. Dr. W. P. Richardson's trophy will be awarded to the member who attends the most club runs during the season. Others who have donated trophies are: Louis T. Weiss, Clarence H. Galt, John F. James, G. F. Newcomb, A. W. Seaman and Charles

Herrmann. Several more trophies are promised in response to a request from President Herrmann that members should assist in popularizing tours. These are to be competed for under conditions imposed by the donor or the discretion of the committee.

Illinois Tries Concrete—An experimental country highway of concrete in Palmyra township, Whiteside county, Ill., is attracting much attention, being the first instance in this state in the rural districts where this material was used to any extent. The road is exceptionally well made, being 8 inches in depth in the center and 6 at the edges, giving a crown of 2 inches. Expansion joints were made, 16 feet apart. The road is 10 feet in width. The road just completed is an experiment and was laid in competition with a brick road in the same vicinity.

Motor Truck Club Election—At the annual meeting and election of officers of the Motor Truck Club of New York, D. C. Fenner was reelected president, Emerson Brooks vice-president, C. E. Stone treasurer, and E. L. Howland secretary. A new board of managers also was chosen, consisting of E. W. Curtis, Jr., George H. Duck, Karl L. Frederick, J. W. Perry, A. W. Robinson, W. Oscar Shadbolt, and Arthur J. Slade. The selections were unanimous, no opposition ticket being presented. Extensive preparations are under way for an entertainment in the novel form of a breakfast, to be tendered a number of leading men in the industry, January 21, during the week of the motor truck show. The committee in charge plans to arrange for addresses by prominent officials of motor truck companies, and an attendance of more than 200 is declared to be assured for the occasion. A report from the membership committee showed an increase in members of more than 100 per

cent within a year. Permanent quarters have been taken at George Rector's, 1845 Broadway, and a clerical force is maintained to handle the details of the work of the club.

To Regulate Traffic—There have been so many accidents in Cambridge, Mass., recently in which motor cars have figured that Henry J. Cunningham, commissioner of public safety, is considering the formation of a mounted traffic squad, comprised of members of the police department.

Alton Way a Sure Go—The Alton way hard road proposition between Chicago and St. Louis was given another boost at an enthusiastic meeting held in Carlinville. It was decided to commence marking the proposed road by painting the telephone poles. There will be a white band at the base 1 foot in width with a black band in the center, 4 inches in width. It was recommended that the road be kept in first class condition and dragged regularly.

Would Spend Tax Differently—Changes in the handling of the North Dakota motor tax to give maximum benefits were considered at a good roads conference between State Engineer T. R. Atkinson and members of the Grand Forks good roads commission. It was decided to draw a bill to provide for the contract system of handling the roads and for cash payment of road taxes. The road men favor a state highway commission, and a change in the method of handling the funds also. A similar bill failed in the legislature 2 years ago. Additional roads sentiment has been developed since.

To Teach Road Building—A 2 weeks' course in road building will be given by the School of Engineering of the Missouri state university in February. A description of the work was a part of the report of State Highway Engineer Curtis Hill to the Missouri Association of County Judges which met in Columbia on December 10. The course will be free to anyone who desires to take it. Other than the lectures by university professors and practical road builders there will be demonstrations, tests and experiments in the engineering laboratories. If the course is well attended it may be lengthened and be made a part of the regular university work next year.

Denver Club's Program—Building a country home at some especially attractive suburban location and improving many miles of Colorado roads are among the activities contemplated by the Denver Motor Club for the coming year. Both of these enterprises, which were announced at the annual meeting of the club this week, have been planned to attract a larger number of motor tourists to the state. The organization already has on hand a road-building fund of \$5,000, which it expects to double before spring. There are now nearly 1,000 members. E. E. Sommers is the new president of the club, Oscar P. Doerr vice-president, and Carl Schwalb secretary and treasurer.

No. 8—In Mississippi



SAME ROAD 1 YEAR AFTER IT WAS IMPROVED



The Motorist's Kindergarten



DITOR'S NOTE—Motor Age is publishing in this department a series of non-technical explanations of the various parts of motor cars for the benefit of the reader who knows nothing about them. The subjects will be dealt with in the most elementary manner, so that the series when completed will form a simple elucidation of the car. The first article appeared October 10, 1912.

At the opening of this series of articles the gasoline engine was compared to a gun in which the gun barrel corresponded to the engine cylinder, the bullet to the piston, and the charge of powder to the explosive mixture in the combustion space of the engine. The comparison was carried further and the percussion cap was likened to the ignition spark. In fact, some of the older types of motors used on railway cars were actually ignited upon starting by exploding a percussion cap in the cylinder. In the early days of the gas engine, the mixture was ignited by a gas flame which was allowed to shoot into the cylinder at the proper time. Later a tube was made to project into the cylinder and was kept hot by fire on the inside of it so that when the gas was compressed slightly the hot tube would explode the mixture. Another arrangement which is used on some stationary motors where a very high compression is employed is to compress the gas to a point where it gets hot enough to actually explode itself.

None of these arrangements, however, is applicable to the motor car engine, chiefly on account of the high speed and the fact that none of the foregoing provide any reliable method for varying the time at which the ignition occurs. The universal method of ignition in motor car and similar engines is electric ignition, and inasmuch as electricity is regarded generally as a very mysterious force, the ignition system is the least understood of any of the auxiliary groups of the motor car power plant.

It is not to be wondered at that the average motorist regards this feature of his car with a good deal of awe, because the nature of electricity is somewhat elusive and it is fair to admit at the outset that nobody knows just what electricity is; that is, no theory as to the exact nature of the force has been generally accepted. But if we do not know just what it is, we do have an exceedingly useful knowledge—if somewhat incomplete—of what it can do. In a great many ways electricity resembles a liquid and this resemblance has permitted us to use, in explaining its actions, what has come to be known as the hydraulic analogy; that is, by comparing it to water, or other liquid, flowing through a pipe we can explain its properties. This hydraulic analogy will be utilized later in elucidating the terms employed in electrical parlance.

There are some ways, however, in which electricity differs from a liquid. One of

Car Ignition Simplified

the peculiar properties of electricity is that it shows a great readiness to travel through some metals and as great a reluctance to traversing most other substances. These peculiar qualities of this mysterious friend of ours gives us a chance to lead it wherever we want to by metal wires and to confine it or insulate it by covering these wires with some substance that it refuses to flow through, such as rubber or mica.

Substances which electricity seems to prefer as a highway are called conductors because they will lead, or conduct, the electricity, while those which it will not flow through readily are called nonconductors, or insulators. The best conductor among ordinary metals is copper, and copper wires insulated with rubber or silk soaked with wax are used most frequently for leading the electricity from one point to another.

Electricity is produced in two ways. It can be made mechanically, that is, by machine, or chemically. It is the latter method that is the simplest and the one

we will take up first. The dry cell and storage cell, with which everyone is familiar, are chemical generators of electricity. If one places a small piece of copper in the mouth on top of the tongue, and a small piece of zinc under it, allowing the outer ends of the two pieces of metal to touch, there will be noticed a tingling sensation in the tongue, or at least an acrid taste. This tingling sensation is caused by the passage of electricity through the tongue, the mouth forming the electric cell, and the slightly acid saliva the electrolyte. When any two different metals are placed in a liquid which has a little acid in it and the ends not in the liquid connected by a conductor, a current of electricity will flow.

Any two plates, one made of one kind of metal and the other of another kind, in a mixture of acid and water will show this electrical effect, but those which give the best results are copper and zinc. The action which occurs is indicated in Fig. 19. As soon as the two outside ends of the plate are connected by a wire or other means which completes the outside circuit,

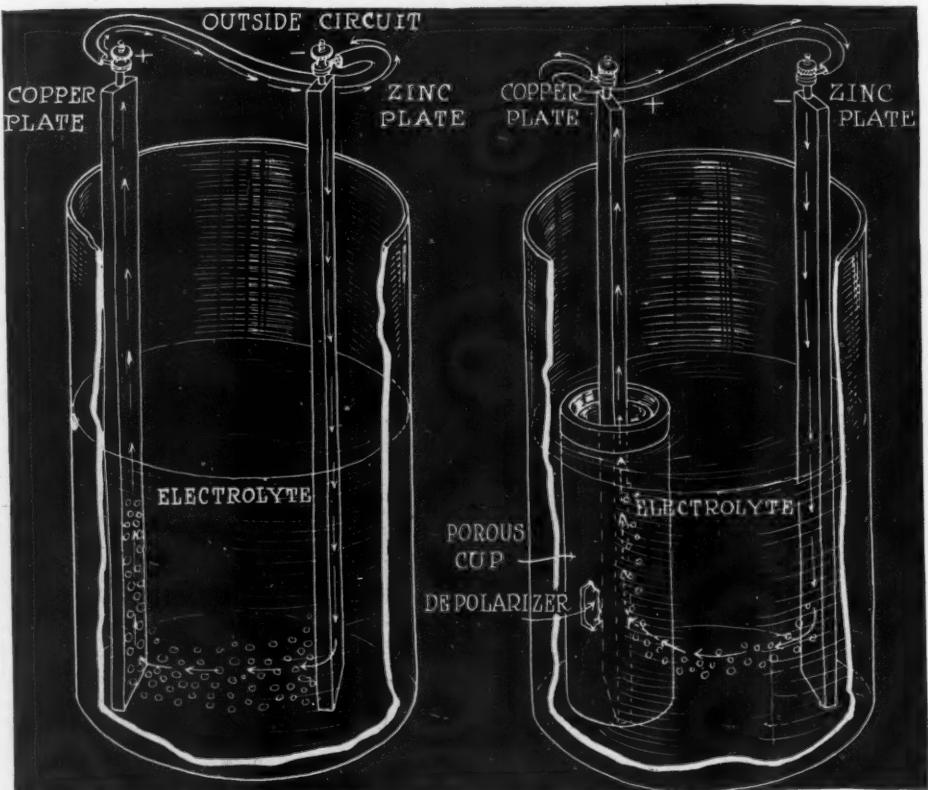


FIG. 19—SIMPLEST FORM OF ELECTRIC CELL

FIG. 20—CELL WITH DEPOLARIZER

In Fig. 19 is illustrated the simplest form of electric generator, a plate of zinc and one of copper in a bath of weak sulphuric acid. The arrows show the direction of the electric current in the cell and in the outside circuit. Fig. 20 shows the cell with the depolarizer added

a chemical action begins between the liquid, which is called the electrolyte and the zinc plate. The electrolyte eats into the zinc very much more rapidly than it does into the copper and the chemical action of the electrolyte on the zinc liberates bubbles of gas, each bubble of which is charged with electricity. Where the bubble gets this charge we will not go into at this time. Suffice it to say that these bubbles of gas carrying the electric charge make their way through the electrolyte to the copper plate, where they collect and give up their electric charge to the copper plate.

So as long as the chemical action continues, these gas bubbles are carrying electric charges away from the zinc plate one after the other and depositing them on the copper plate so that the copper plate is charged much more than the zinc plate is. Whenever one end of a conductor, or one part of the electric circuit is charged more highly than the other electricity will flow from the more highly charged portion to the less charged portion. The copper is said to have a higher potential than the zinc and wherever there is a difference in potential there is a flow of electricity, provided there is a conductor for the electricity to flow through. Consequently, in the simple cell, illustrated in Fig. 19, there will be a flow of electricity in the cell itself from the zinc to the copper with the gas bubbles. Also on the outside of the cell there will be a flow of electricity through the wire in the direction of the arrows from the copper terminal to the zinc terminal. The copper is called the positive terminal and the zinc the negative terminal. Instead of copper, carbon is quite often used as the positive terminal, with an alkali electrolyte.

In the case of cells of this kind where carbon or copper is used, the more rapidly the electricity flows in the outside circuit the more rapidly it flows through the electrolyte and the more rapidly the gas bubbles pass from the negative to the positive plate. When this action takes place rapidly, that is when there is heavy flow in the outside circuit, the gas bubbles are deposited on the positive plate faster than they can pass off into the air and the bubbles will begin to pile up on the side of the plate so that those that come later cannot give up their charge to the copper plate. The electric action slows down and finally stops and the cell will generate no more electricity until those bubbles which have covered the plate have had an opportunity to pass off. This is what is known as polarizing and it is overcome by putting around the copper plate, or carbon plate, a depolarizing solution usually called a depolarizer. This is contained in a case which will hold the depolarizing liquid, but which allows the gas to pass through from the negative plate. The depolarizer is simply a liquid which absorbs the bubbles so they do not pile up on the positive plate. See Fig. 20.

Manufacturers' Communications

NEW YORK.—Editor Motor Age— Among the many grotesquely absurd and illogical measures presented by inexperienced and misguided legislators, the new highway regulations now pending before the national highway commission of New York restricting the weights which can be placed on motor trucks on New York highways represents highway legislation raised to the nth power of assininity. It is a measure that if enacted will impede progress in motorized highway transportation such as no other measure or set of measures ever could effect. Briefly speaking, this measure seeks to block the wheels of commerce by taking the illogical premise that roads should be built only for horsed vehicles and not for motor trucks. In other words, these regulations take the attitude that our roads are already good enough for horse vehicles and that the policy of "let well enough alone" must be adhered to and that the motor truck has no right on the public highways. This measure is the most direct thrust at industrial progress that ever has been presented for the serious consideration of intelligent people.

No sane, well-informed individual who knows road conditions in the United States and in Europe will grant that American road building is anything more than in its infancy and that as large as the sums appropriated for highway improvement have been, they are not adequate for the building of the permanent highways which Europe has had the farsightedness to build and which have been the instruments for reduction of the cost of highway haulage to but a fractional part of what it costs in the United States to move a ton of freight over our crude roads.

Instead of attempting to restrict the growth of motorized highway commerce which the public demands to effect a quick and economic movement of the necessities of life and cut down the frightfully excessive cost of living, these agitators against the use of motor trucks on the highways would have us continue to move our commodities as did the ancient Egyptians 5,000 years ago. Instead of aiming a blow at the motor truck it would seem that they would take the broad,

philosophical view of seeking to encourage the building of highways to bring about that long desired era in economic distribution of the commodities of commerce which every unprejudiced, sensible, well-informed student of economics knows can never be gained by the continuance of obsolete roads and obsolete vehicles.

If the \$50,000,000 that have been appropriated by the New York legislature for highways is used in an intelligent, honest manner to build the kind of highways which commercial conditions of this city demand, there could be no possible objection to the use of any wheeled vehicle whether operated by steam, gasoline or electricity on them. No motor truck, even if it were practical to build them with weights of 20 tons on each axle, could do the slightest damage to a highway built of cement, for example; and the contention that motor trucks do damage even to the comparatively crude roads now in existence is the statement which emanates from prejudiced interests against the motor truck.

In the first place everyone knows that motor trucks use wide rubber tires and that the distribution of the load per unit of tire surface is considerably less than distribution of the load on a narrow, steel-tired vehicle which cuts deeply due to the localizing of the pressure on a narrow strip of surface. Again, there is practically no destructive shock against the surface of a road by a motor truck equipped with 5 or 6-inch double rubber tires with which most trucks of even 4 or 5 tons aggregate capacity are equipped. The easy action of a rubber surface against any road material, particularly on a vehicle like a motor truck which does not average more than 10 miles per hour in medium size units on country highways, is not anything like as destructive as the use of say a four-horse team equipped with 3-inch steel tires operating on asphalt-surfaced highways in warm weather. Furthermore, the abrading section of a macadamized highway caused by the suction generated by the tires of a rapidly moving pleasure motor car is entirely absent in a motor truck, as the speeds cannot be attained with commercial motor vehicles which set up this scouring effect.

The whole problem resolves itself into the broader and farsighted view of building highways to realize the best possible advantages of the era of motorized highway transportation and not the ignorant and narrow attempt to forestall the far-reaching material, social, and humanitarian benefits which the motor truck can give to the world.—International Motor Co., R. W. Hutchinson, advertising manager.





Among the Makers and Dealers



QUICK-LOADING TRUCK

QUICK loading and unloading is an important requirement in motor truck work and especially where hauls are short. Very often the success of motor hauling depends more on the arrangements for serving the truck in this regard than on the mechanism of the motor vehicle itself. The annexed illustrations show the loading and unloading of a Wilcox truck used in hauling sand and gravel for a contracting firm. The upper picture shows the loading bin. At the left is a small hand car. On this car the gravel and sand is brought to the bins. Projecting above the bin is seen the bucket loader. This device in loading the bin from the car sorts out the gravel to proper size, discharging the stones by a side chute. The motor truck backs under the chute to the position shown, when the pull of a lever allows the gravel to drop into the body. The truck is moved forward as the gravel comes down, spreading the load evenly. The lower picture shows the crank-operated dump body tilted at an angle and almost ready for the opening of the tailgate.

NEW Warren Sales Manager—The new sales manager of the Western Motor Co. is R. O. Gresham, former superintendent of agencies for the south and middle west.

Not General Electric Branch—Through an error it was stated in last week's Motor Age that Gray & Davis was a branch of the General Electric. Such is not the case, Gray & Davis being an independent concern.

Imperial in New Plant—The Imperial Automobile Co. now is located in its new plant at Jackson, Mich., formerly the Buick factory. The building is the largest factory edifice in Jackson. A new model will be manufactured by the company in the new plant. This model will be a six-cylinder. The new plant and increased force will insure the prompt delivery of cars, no matter how great the demand.

Solving Used Car Problem—The used car problem in Los Angeles is becoming a serious one. Recently a plan has been discussed which, it is believed, will relieve the situation. After carefully going over the plan the dealers agreed to put it in operation. It is a very simple one and consists in taking the customer's car in, placing it on the floor, advertising it and endeavoring to secure a customer for the car at the best price possible. In the meantime the customer having signed an order for a new car, when the old one is sold the proceeds are credited on the new car. In case the customer demands an immediate delivery of his new car, he is to pay cash for it, and when the old car is sold the money is sent him without any charge for



WILCOX TRUCK USED IN HAULING GRAVEL

disposing of his second-hand car. Under this plan the dealer can make a fair margin of profit, and with this profit can give his customer better service.

Self-Starter Factory Opened—The Hammeix Co. has opened its new factory for the manufacture of acetylene self-starters and generators in Indianapolis.

Urban to Succeed Moskovics—To succeed Fred E. Moskovics, whose resignation takes effect March 1, 1913, Fred J. Urban, special representative of the Remy Electric Co. in Chicago and Detroit territory, will become general sales manager.

Strike May Effect Boston—The strike of the body finishers in Detroit may spread to Boston, for at a meeting in the Hub Thursday a committee was appointed from one of the labor unions to look into the report that some of the body work being held up in Detroit was being shipped to Boston to be completed. In Boston there are some large body building plants, and a couple of the big motor car companies such as the Packard and the Peerless have departments where they make their own tops

and remodel bodies. They could finish bodies if called upon to do so. To prevent this a watch will be kept and if any bodies are shipped from the west there will be a strike.

Cline Makes a Change—B. J. Cline, formerly factory superintendent of the American Motors Co., of Indianapolis, Ind., has resigned his position with that company and has accepted a position as general superintendent with the Inter-State Automobile Co. of Muncie, Ind.

McDuffee on Stearns' Staff—The F. B. Stearns Co., manufacturer of Stearns-Knight cars, has announced the appointment of Joseph H. McDuffee, formerly of Chicago and Denver, as western sales manager, taking charge of the entire territory from Denver, west to the Pacific coast.

New Compensation Act Tested—The first motor car company to be able to test the workings of the new Wisconsin workmen's compensation or industrial insurance act is the Mitchell-Lewis Motor Co., of Racine, Wis., which last week was called on to pay the sum of \$3,000 to the widow of Louis Race, an electrician employed by the Mitchell company, killed in an accidental fall. Ordinarily the widow would have been obliged to commence suit for damages and wait possibly 2 or 3 years for the ultimate outcome. Under the Wisconsin industrial insurance law the employer is required to pay the heirs of the deceased employee on the basis of earnings for a stated period. Payment thus went to the heirs within a period of 4 weeks after the accident actually occurred. It is optional with employers to accept the law or not. In either event the employer usually carries indemnity

insurance which covers all claims, just as before the law went into effect. This was one of the first large cases since the law became operative.

Adding to Kokomo Plant—Byrne, King-
ston & Co., Kokomo, Ind., are erecting a
new brick addition to their plant, 160 by
84 feet, two stories in height. At the
present time 864 men are employed, and
the plant is running night and day.

Goodyear's Canadian Officers—At the
annual meeting of the Goodyear Tire and
Rubber Co. of Canada, Ltd., held in To-
ronto, a satisfactory statement was pre-
sented and the following officers were
elected: F. A. Seiberling, president; C. H.
Carlisle, treasurer and general manager;
P. D. Saylor, vice-president and sales man-
ager; C. J. Oille, assistant treasurer; R.
P. D. Graham, secretary; J. J. Moriarty,
superintendent.

Henderson Plans—The Henderson fac-
tory will be closed down until January 1
while the different departments are acquir-
ing additional space in the new addition to
the factory which will give the Indianapolis
plant a floor space of 55,000 square feet.
Before production is resumed an inventory
will be taken and the first of the year an
additional force will be added and the pro-
duction will be doubled for January and
February and trebled in the ensuing months
of the 1913 season. J. M. Smith has been
made factory production manager.

Moon's New Testing System—A new
system just installed in the motor testing
department of the Moon shops in St. Louis
makes it possible to operate the testing
department without using any of the power
developed in the main power plant. In
addition, this system enables the testers to
secure accurate records of the actual per-
formances of each motor which passes
through their hands on the way to the
assembling department. The Moon testers
heretofore have run each motor by belt
drive for many hours to wear in the bear-
ings and prepare it for test under its own
fire. Now each motor which is being tested
under its own power drives another motor
through the wearing-in period, and no
power whatever is delivered to the testing
department from the outside. The new
system involves suitable handling equip-
ment, racks and couplings, whereby a large
number of pairs of motors may be tested
at one time. Each pair consists of a motor
running under its own fire and the motor
which is being worn in and which formerly
required belt-drive power from the main
power plant. When the motors under fire
have been tested for a number of hours at
varying speeds, they are given a rough
dynamometer test, which gives the testers
exact information as to the power which
each individual motor will develop. It
will thus be possible, if the number of a
motor is given at any future time, to tell
exactly what that particular motor did on
the test board. At the end of the dyna-
mometer test each motor is taken down

and each part examined by inspectors to
determine whether it has been performing
its work properly. Motors that stand in-
spection are then reassembled and deliv-
ered to the chassis assembly department to
be fitted to chassis for road testing.

Good Outlook on Coast—Brighter pros-
pects never loomed for motor car dealers
on the Pacific coast. There is a feeling of
sound financial conditions evident every-
where. It is not alone in Portland, Seattle
and Spokane and other centers of the north-
west that the business is in such healthy
condition, but this feeling of certainty is
found in the country towns as well.

Looking After the Workmen—The Gar-
ford company employs a workman who is
constantly on the go about the plant, keep-
ing the temperature at the right degree
for the best comfort. An interesting fea-
ture on the needs of workmen has been
demonstrated under this plan, too; that is,
that men doing close, accurate work need
more heat than those doing ordinary duty.
While 60 degrees Fahrenheit is sufficiently
high for all other departments of the
plant, the toolroom employees cannot get
along with less than 65 or 70 degrees.

Trying to Collect Assessments—The Ad-
vance Machine Co. of Detroit, formerly the
Hale Motor and Machine Co., has given
notice through its president, Peter M. Detz-
ler, and its secretary, R. J. Brennan, that
on January 22, at the office of the secretary,
654 Franklin street, Detroit, at 10 a. m.,
enough stock of Carl I. Overton, John K.
Teetzil, William W. Johnson, J. L. Allen
and J. G. Bayerline will be sold at public
auction to pay assessments levied upon the
stocks held by these men, together with
interest and cost of the sale.

Illinois Dealers Meet—At the monthly
meeting of the officers and executive com-
mittee of the Automobile Dealers' Asso-
ciation of Illinois, held at Springfield, the
date for the annual meeting to elect of-
ficers was fixed for February 6, 1913, in
Chicago, in connection with the annual
Chicago show. John D. Strutz, of Joliet,
and W. A. Lumpkin, of Mattoon, were
elected directors to succeed L. J. Weisen-
horn, of Quincy, who has retired from the
business, and Mason Towle, of Joliet, who
has removed to Cincinnati. It was decided
to add Tennessee to the proposed state
combination and at the Chicago meeting

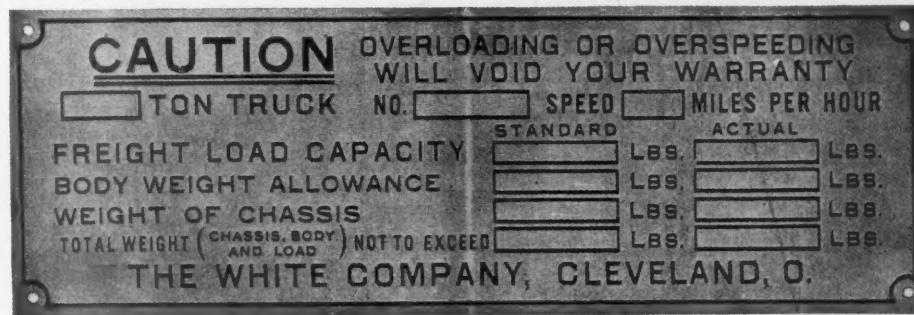
it is planned to organize the dealers of
Illinois, Iowa, Indiana, Wisconsin and
Tennessee. This interstate organization
will be gradually increased until all of
the middle states are combined.

Increase in Gasoline Price—An advance
of 1 cent in the prices of all grades of
asoline was made on December 20 to all
Milwaukee garages by the oil supply com-
panies. Garages are now paying 15 cents
per gallon for 60 to 63 test; 17 cents for
65 to 68 test; 18½ cents for 70, and 19½
cents for 72 to 74 test, to which the gar-
ages add about 4 cents.

Trade Election at Winnipeg—The annual
meeting and banquet of the Winnipeg
Motor Trades Association resulted in the
selection of G. A. Maleolmson as president,
A. Maw vice-president, J. B. Urquhart
treasurer, and P. C. Hagarty secretary. A
building for the holding of a motor show
has been offered to the association and a
special committee was appointed to con-
sider whether it was possible for this show
to take place during the second week of
February.

New Leather Company Formed—The Ar-
mitage Leather Co., with a capital of \$35,-
000 has been organized in Detroit and a
plant has been opened at 87 West Congress
street. Walter S. Gurd, E. S. Barbour and
R. B. Gillespie, of the Michigan Stove Co.,
and Edwin Armitage are the organizers,
and the company's principal business will
be the production of leather for use in
motor cars. It is claimed by the new com-
pany that Armitage has discovered a secret
process which will make its product of a
superior quality. The company hopes
within a year to erect a tannery.

New Board of Trade Members—Four
new members have been elected by the
Automobile Board of Trade and have qual-
ified for membership in that organization.
They are as follows: Federal motor truck,
Inter-State, Imperial and Stutz. The ac-
cessions bring the membership of the A.
B. of T. up to sixty-three, which is a new
high record for that association. The pres-
ent tendency to be noted in the national
organization is to absorb individual mem-
bers of the National Association of Auto-
mobile Manufacturers, so that when the
time arrives for the merger of the two
bodies that the change will not be radical
as far as the members are concerned.



N. A. A. M.'S STANDARD CAUTION PLATE

This is a sample of the new N. A. A. M. caution plate. It is 9 by 3 inches and the letters are recessed on polished brass ground

Development Briefs

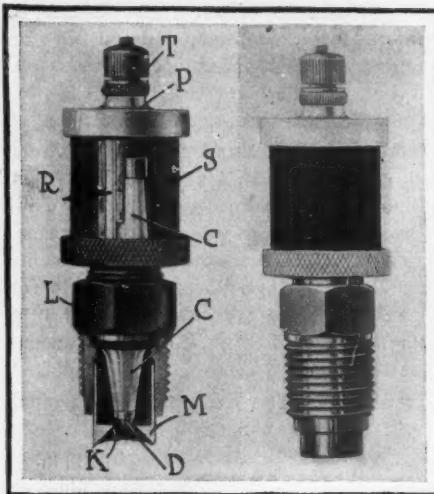


FIG. 1—McCORMICK POWER PLUG

Fordrec System

HERE has long been a demand for a means of using the Ford alternating current magneto for illumination of the car. The difficulties to be encountered in this are in the fact that since the output of the Ford magneto is not direct it must be rectified or commutated before being used for direct-current illumination. The Fordrec system, by means of a small, light-weight rectifier, a storage battery, and a throw-over switch to change from magneto

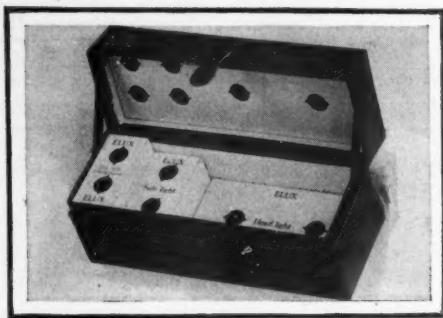


FIG. 2—ELUX LAMP CHEST

to battery, enables the Ford owner to use the surplus output of his magneto for lighting. Connections are made from the magneto to the rectifier, permanently. This rectifier is so arranged that current can only pass in one direction, from the magneto to the battery. From the rectifier wires lead to the throw-over switch, by which the lamps may be connected to the rectified magneto circuit, or to the battery. When no lamps are lighted the current passes from the rectifier to the battery. Two 8-candlepower 12-volt headlights, two 4-candlepower side lights, and one 2-candlepower tail light are supplied by this system. This maximum capacity is of course governed by the capabilities of the magneto. The American Battery Co., Chicago, is the maker.

McCormick Power Plug

The McCormick power plug differs from other spark plugs in that it does not rely on an electric spark to ignite the bulk of the gas in the combustion chamber, but utilizes the electric portion of itself to

ignite only a small volume of gas confined in a closed chamber with a small opening. The ignition of this gas in such a chamber causes it to issue from the small opening in the form of a sharp tongue of flame, which is more suitable for the ignition of the balance of the compressed gas than any electric spark. The spark itself is different from most ignition sparks in that it is projected from a knife-edge ring to a conical center electrode in the form of a series of sparks, instead of but one.

The plug is shown in Fig. 1, in an exterior view and section. T is the terminal clip and lock nut, mounted on porcelain cap P. C is the main porcelain core, about the upper portion of which is located a condenser R, secured by a steel case S, which threads on the steel shell L. The central electrode D is in the form of a cone, adjacent to the knife-edge terminal K, an integral portion of the removable spark chamber M.

Claims for this plug are: that due to the increased speed and thoroughness of flame propagation, economy of gasoline and increased horsepower results; that due to the passage of gases over the sparking terminals, the plug never fouls; and to the use of the condenser, increased electrical efficiency and economy is attributed. The plug is the product of the McCormick Mfg. Co., Dayton, O.

Sly Tire Holder

Smalley Daniels, Detroit, offers a pressed steel type of tire holder that may be attached to the running board. No fastenings to the body or dash are needed, as the tire is held in a continuous cradle incasing the entire lower portion of the tire. Two supports, wide apart, secure this to the running board, while a substantial clamp, also secured to the running board, locks the tire in the holder. The clean lines of the holder do not mar the appearance of the car, and the continuous cradle does not chafe the tire in spots. No straps are used, and the simple folding back of

the clamp enables the tire to be removed. These holders are made to fit all sizes of tires, and in single or double units. They are finished in black enamel. This holder is shown in Fig. 3.

The C. C. Electric Vaporizer

Invented by L. C. Church and J. A. Cooney, Bartlesville, Okla., the C. C. vaporizer is an attachment for the manifold of a motor car engine that is being manufactured by the Cherokee Motor Car Co., Bartlesville, Okla. It consists of a printh, the same shape as the manifold flange, designed to be interposed between the manifold and the carburetor. It provides a passage for the gas the same size as the carburetor outlet, across which is



FIG. 4—TABOR CLUTCH LOCK UNLOCKED

a series of cross wires, electrically heated. The current is taken through two binding posts on the rim of the body of the device. The hot wires serve to heat and super-vaporize the mixture, as well as to fulfill their purely mechanical function of breaking them up. This heat being independent of the engine itself may be applied before starting the engine, thereby facilitating starting. It may be used as a starting attachment only or the current may be left on during the running. In connection with electric engine starters, this may be arranged to take current simultaneously with the operation of the starting engine, being cut out when the latter is stopped. The device is shown in Fig. 6.

Hagstrom Suction Primer

As simple as priming through the petcocks, but claimed to be much more effective, the improved Hagstrom suction priming cup is offered by the Hagstrom Brothers Mfg. Co., Lindsborg, Kan. It consists of a small brass well with a spring valve in the top, through which gasoline

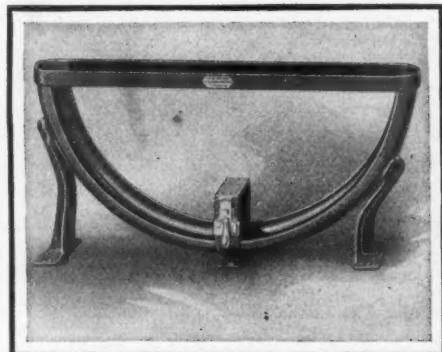


FIG. 3—SLY TIRE HOLDER

Novelties for Motoring



is injected before starting, with an oil can. The gasoline in the bottom and the air above it are sucked up into the intake manifold through a small tube which communicates through a needle valve with the outlet pipe. This outlet pipe, which is a short projection of the primer body, is screwed into a hole tapped in the manifold between pairs of cylinders. The needle-valve is adjustable to vary the amount of mixture admitted to attain the best results, and if closed after the engine starts will prevent the engine taking in extra air through the vent.

Randerson Double-Rail Bumper

Of the spring-retained piston-and-plunger type, the Randerson model M, double-rail steel bumper is shown in Fig. 8. It

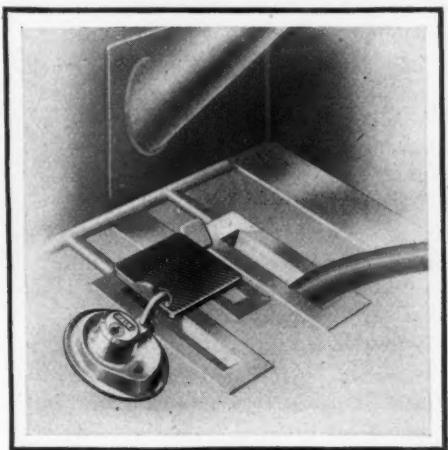


FIG. 5—TABOR CLUTCH LOCK, LOCKED

embodies the original features of an all tubular construction, and a reinforcing rail as an auxiliary to the main bumper. The two cross-rails are made of reinforced steel tubing, sweated to the retaining fittings so as to prevent rattle. The arms are finished in black enamel, with rails in black enamel, nickel or brass. Randerson Auto Parts Co., New York, are the manufacturers.

Tabor Clutch Lock

The Tabor clutch lock consists of a Yale cylinder lock with a U-shaped swing-bolt to engage the clutch pedal, when in release position. Fig. 4 shows the lock in inoperative position, inconspicuous and out of the way. With the clutch depressed, the swing-bolt is inserted in the hole in the clutch pedal, and pushed down until it latches, as in Fig. 5. As the car cannot be run with the clutch disengaged, the effectiveness of this lock is apparent. However, there is nothing to prevent the garage hands from pushing the machine about for washing, or out of the garage, in case of fire. The screws

that secure the lock plate to the foot-board are accessible only by the removal of the cover of the lock, which can only be accomplished when it is in inoperative position. This lock is the product of the A. L. Lovely Co., Detroit.

Zero 40

Guaranteed not to freeze above 40 degrees below zero, Zero 40, a light, colorless and almost odorless fluid, is offered by the Automobile Equipment Co., Detroit, as an anti-freeze fluid for motor car radiators. Zero 40 is said to be a natural mineral water, and not a compound, and it is guaranteed to have no more effect on the metal or rubber parts of the cooling system than natural rain water.

Elux Lamp Chest

To enable purchasers of Elux mazda motor lamps to safely carry a spare supply in the tool box, the Elux Miniature Lamp Works of the General Electric Co., New York, hereafter will market an especially designed lamp set, including one tail light, one speedometer light, two side lights and two headlights. These are carried in the Elux lamp chest, Fig. 2. This chest is 8½ inches long, 3½ inches wide and 3 inches high, over all.

The chest proper is made of news board, covered with leatherette paper. Protection of the lamps is obtained by the use of a false top and stepped false bottom. Holes in these serve to hold the lamp in an upright position, and to prevent their rattling about in the box. The two nicks or slots in the sides of the holes are to accommodate the bayonets of the Edi-swan catch base, with which all of these bulbs are fitted. A leather button flap is used to secure the lid, and on the top of each box is a lid to designate the makes of cars to which the goods contained therein

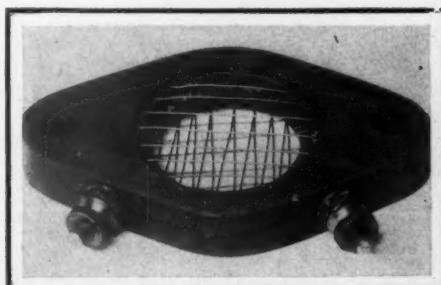


FIG. 6—C. C. ELECTRIC VAPORIZER

are adapted. Single bulbs may be purchased to take the place of those taken from the box to replace broken or burned-out lamps.

Amper Auto Lock

Fig. 7 illustrates a combination lock

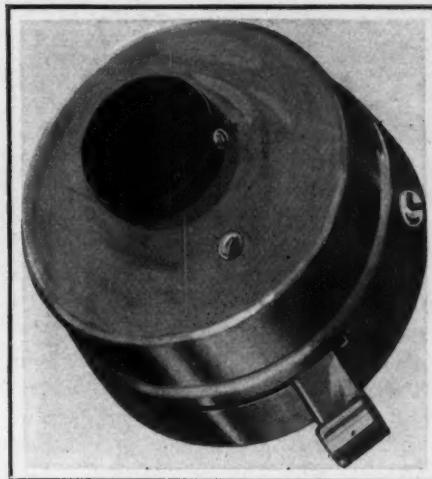


FIG. 7—AMPER MOTOR CAR LOCK

switch for motor cars. This switch is screwed to the dash, coil box, or elsewhere in a convenient position, by screws from the inside of the case, which are inaccessible without operating the lock. The operation is by means of a simple kick-lever, and a small combination knob. The combination is a series of disks, which are notched, pin-tumblers entering slots in their periphery, the clicks being

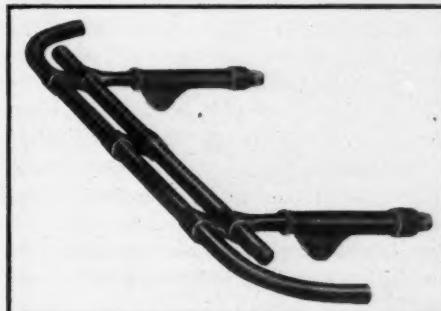


FIG. 8—RANDERSON BUMPER

counted as the knob is turned, instead of there being calibrations to watch. A locking bolt holds the switch bar from the contacts, until the combination is in the proper position. It is claimed that the contact cannot be made with the combination off by means of a wire or cotter pin, and the fact that the screws are inside, and cannot be reached without setting the combination to remove the case, makes the removal of the instrument impossible. The lock may be operated in the dark, as there is nothing to watch, only the clicks to be counted as the knob is turned.

Ford J-M Shock Absorber

Due to the peculiar spring suspension of Ford cars, the standard types of J-M shock absorbers cannot be installed in this make of car. The J-M Shock Absorber Co., Philadelphia, has brought out a special design of this appliance adapted to installation on Ford machines. It operates on the same principle as other absorbers of this make, but has but one cylinder instead of two. A special bracket is used in place of the Ford bracket.



Brief Business Announcements



KIRBY, O.—Philip Oelberg has built a 32 by 36 garage at Kirby, and will handle the Ford.

San Francisco, Cal.—The Reo-Pacific Co. is now installed in its new quarters at 555 Golden Gate avenue, San Francisco.

Ogden, Utah.—The James Automobile Co. will erect a new garage. The plans call for a building 40 feet front by 140 feet deep.

Detroit, Mich.—W. A. Ryan has been appointed manager of the Ford Motor Co.'s Detroit retail store. He formerly was manager of a department at the factory.

Boston, Mass.—The R. L. & H. H. Smith Co., agent in Boston for the Mais truck, has moved from 1002 Commonwealth avenue in the Back Bay to 17 India street.

Detroit, Mich.—Walter I. Jordan, formerly western traveling representative for the Flanders Motor Co., has become manager of the local branch for the Hoffecker Speedometer Co.

Richmond, Va.—The Chesterfield Motor Car Co. is in new quarters on West Broad street, while the home of the Foster Motor Car Co. has been remodeled. The latter company is specializing with the Klinekar.

Springfield, Mass.—The Westfield Motor Truck Co., organized at Westfield, Mass., and with branches in Springfield and Boston, has filed a petition in bankruptcy with liabilities at \$20,616.67 and assets about \$4,000.

Neenah, Wis.—The J. F. Stroebel Co. of Neenah has broken ground for a fireproof building to be used as a garage, repair shop, agency and farm implement warehouse. The building will be three stories high, with a high basement and cost about \$50,000.

Boston, Mass.—The C. B. Johnston Co., just formed in Boston, has taken on the Pullman and the Ames cars in addition to the Stewart truck. Salesrooms have been opened in the Motor Mart, Columbus avenue.

Minneapolis, Minn.—Charles S. Marshall, manager of the Minneapolis branch of the United States Tire Co., has resigned to become northwestern agent for the Racine Rubber Co., 911 First avenue S. This is to be a new branch. E. B. Tozier of the Diamond Rubber Co., succeeds Mr. Marshall.

Milwaukee, Wis.—The Milwaukee branches of the Goodrich and Diamond tire concerns have been merged, and the local business will be continued at the old Diamond branch house at 132-136 Oneida street. The Goodrich branch at 450 Jackson street is discontinued. J. T. McDonald, manager for the Goodrich company at

Milwaukee for several years, has been placed at the head of the consolidated branches.

Cleveland, O.—R. M. Hawkins has resigned as assistant purchasing agent of the Standard Welding Co.

Pittsburgh, Pa.—The Craig-Center Auto Co. has taken a long lease on the property at the corner of Grais street and Center avenue. The company is a dealer in second-hand cars.

Toledo, O.—The Willys-Overland Co. of Toledo, formerly the Toledo Motor Co., has filed papers with the secretary of state changing its name to the Central Grove Automobile Co.

San Diego, Cal.—The Columbus Buggy Co. has opened its new branch factory in San Diego. O. K. White has been appointed manager. Recently a branch was opened in Pasadena.

Indianapolis, Ind.—Cecil Taylor, formerly engineer for the Chalmers, Hudson and Studebaker, is now consulting engineer for the Rutenber Motor Co., with factories at Logansport and Marion, Ind., and in Canada.

Bowling Green, O.—George E. Mercer, of Bowling Green, has been thrown into involuntary bankruptcy by Eugene Jones, the Bowling Green Garage Co., and B. F. Heriff, whose claims amount to nearly \$1,000. E. D. Bloom has been appointed receiver.

Boston, Mass.—Arrangements are being made to place an agency for the Nyberg car at Boston, the first steps being the leasing of quarters for a service station at 233-239 Massachusetts avenue, Cambridge, just across from the Boston motor district.

South Bend, Ind.—The Milton G. Smith Garage and Automobile Co. has increased its capital stock to \$25,000. With the increased capitalization, two new stockholders, L. W. Spring, of Chicago, and Harvey Garber, of South Bend, were added to the list.

Philadelphia, Pa.—Stephen W. Bourne, formerly western sales manager of the F. B. Stearns Co., has been appointed manager of the Philadelphia branch, relieving G. Hilton Gautert, who, however, will still remain with the company in the capacity of special representative. Mr. Gautert has been in poor health lately.

Chilton, Wis.—The city of Chilton, Wis., now has its first complete garage, salesroom and repair shop, the Hippe Motor Car Co. having completed a two-story building, 50 by 80 feet in size, in which general motor car work will be carried on. The Hippe Motor Car Co. is headed by Herman Gierow and Robert Hippe is sec-

retary and treasurer. The company has the agencies for the Overland, Rambler and Buick cars.

Delta, Utah.—The Millard County Transportation Co. will erect a new garage in the spring.

Racine, Wis.—The Racine Brass and Iron Co. has broken ground for a new office building and is making improvements in its works.

Kiel, Wis.—The Kiel garage has been purchased by Walter M. Loos from his father, J. G. W. Loos, who retires because of ill health.

Detroit, Mich.—W. J. Ready, superintendent of the Lozier Motor Co., has resigned to become manager of the Star Motor Co. of Ann Arbor.

Salt Lake, Utah.—The Elliot Motor Car Co. is the newest concern to open up in this city. The company will handle the Oakland. Harry Elliot is the manager.

San Francisco, Cal.—The San Francisco branch of the Franklin Automobile Co. has moved from Golden Gate avenue to 1635-45 California street, just east of Van Ness avenue.

San Francisco, Cal.—L. V. Lynch, formerly president and manager of the Speedwell Motor Car Co., of California, has been appointed western district manager for the Speedwell.

Milwaukee, Wis.—By taking on the Chalmers line, the Smith-Hoppe Auto Co., 215 Wisconsin street, now carries the two original lines of the Kopmeier Motor Car Co. of Milwaukee—the Detroit electric and Chalmers.

Washington, D. C.—The White Automobile Co. has been formed to handle the White line of pleasure and commercial cars. The company has secured the salesroom at 1312 Fourteenth street, N. W., formerly used by the Chapman-Love Co., agent for the King.

Racine, Wis.—The Perfex Radiator Co. of Chicago, which recently moved its plant to Racine, has filed articles of incorporation in Wisconsin. The authorized capital is \$15,000 and the incorporators are John P. Wolf, A. B. Modine and F. M. Opitz. The company has already started the manufacture of radiators, pumps and other cooling devices for motor cars and trucks.

Indianapolis, Ind.—H. G. Deupree, for the past 2 years assistant sales and advertising manager of the Remy Electric Co., Anderson, Ind., has resigned to become vice-president and active executive of a large real estate company in Indianapolis—the Sourbier-Emrick Realty Co. Ed. G. Sourbier was the founder of the Marion Motor Car Co., of Indianapolis; was associated with J. N. Willys in the develop-

ment of the Overland company and recently sold out large holdings in the Ideal Motor Car Co.

Detroit, Mich.—Sydney J. Grant has been appointed Detroit branch manager for the Grinnell Electric Car Co.

Ripon, Wis.—Schaefer Brothers have leased the former washing machine plant at Ripon and opened a garage, repair shop and agency.

Richmond, Va.—An amendment has been issued to the charter of the Taylor Motor Co., changing its name to the Lynchburg Motor Car Co., Lynchburg, Va.

Washington, D. C.—George T. Howard has been appointed manager of the local branch of the Goodyear Tire and Rubber Co., succeeding F. W. Powers, who has been promoted to the management of the Goodyear branch in Philadelphia.

Boston, Mass.—Harry A. Clapp has formed a motor corporation capitalized at \$30,000, of which he is president; Harry McCaffrey, treasurer, and F. O. White, secretary. It is called the Simplex Automobile Agency.

Detroit, Mich.—Akron will be headquarters of John V. Mowe, formerly manager of the Detroit branch of the Firestone Tire and Rubber Co., after January 1, at which time his resignation from that office becomes effective. Mr. Mowe goes with the Goodyear Tire and Rubber Co.

Chippewa Falls, Wis.—The Chippewa Falls Auto Co., of Chippewa Falls, Wis., has opened its new garage. The building is three stories high. The company also has a large garage at Eau Claire, Wis. F. A. Bigler is general manager of the concern and A. L. Redmond will manage the

new Chippewa Falls end of the business. The lines handled by the concern are the Rambler and Studebaker.

Indianapolis, Ind.—Harry J. Enders has been made general superintendent of the Oakes Co., making radiator fans.

Fresno, Cal.—The Oakland Motor Co. has opened a branch in Fresno under control of the San Francisco branch. Charles B. Sargent has been made manager.

Racine, Wis.—Charles A. Armstrong, assistant sales manager of the Mitchell-Lewis Motor Car Co., Racine, Wis., has resigned, effective January 1. A successor has not yet been chosen.

Boston, Mass.—L. B. Johns has been appointed manager of the New England branch of the General Motors Truck Co., with headquarters at the company's office on Boylston street, Boston.

Janesville, Wis.—The E. A. Kemmerer Automobile Co. has taken occupancy of its new garage building, erected at a cost of \$35,000 and covering nearly a half block at 206-208-212 East Milwaukee street. The building affords 37,500 square feet of space and 300 cars may be stored in it.

Indianapolis, Ind.—John W. Wilson and Philip C. Smith have leased a building at Lawrenceburg, Ind., in which they will manufacture a motor car wheel upon which Mr. Wilson has recently been granted patents. About forty men are to be employed in the new plant at the start.

Detroit, Mich.—Walter H. VanDusen, formerly with the Chalmers Motor Co., and Joseph Warren, formerly with the Chalmers, Metzger and Abbott companies, have formed a business combination to be known as the VanDusen-Warren Sales

Co. The new concern will have offices in the Ford building and will act as agent for manufacturers of accessories.

Racine, Wis.—Harrison D. Flegel of Racine is about to market a new type of gauge for measuring the depth of liquids in tanks. Mr. Flegel is establishing a workshop for its manufacture.

Ripon, Wis.—The firm of Stewart & Meier has been organized here to conduct a garage, repair shop and agency business. Charles Meier formerly managed the Third Street Garage Co. and Standard Exchange Co., of Milwaukee, Wis.

Detroit, Mich.—Orin S. Wilson, formerly manager of Studebaker branches at Denver, Colo., and Des Moines, Iowa, has been assigned to the east and south as district representative of the Studebaker sales department. His headquarters will be in New York city, Broadway and Fifty-ninth street.

Sheboygan, Wis.—J. L. Evans and M. P. Hanson of Racine, Wis., have established the E. & H. Motor Co. of Sheboygan, to distribute the Mitchell and Regal, and the Chase commercial car. Temporary quarters have been established in the Erie garage, but in the spring a large building will be erected for the new company.

New York—The Motometer Co., Inc., was recently organized with headquarters at 1784 Broadway, New York city, George Townsend II is president and treasurer, and Harrison Boyce, secretary. The company will market a new device invented and patented by Mr. Boyce, and known as the motometer. It is an instrument, which by an ingeniously arranged dial, tells the driver at all times the exact heat of his

Recent Agencies Appointed by Motor Car Manufacturers

PLEASURE CARS

Town	Agent
Auburn, N. Y.	Stillwell Auto Co.
Bartlesville, Okla.	Cherokee Motor Car Co.
Baltimore, Md.	D. C. Walker Auto Co.
Beaver Falls, Pa.	Seaman & Williams Co.
Berlin, Ont., Can.	Aaron Bricker
Boston, Mass.	J. W. Bowman
Brockton, Mass.	L. E. Reynolds
Charlevoix, Mich.	J. A. Vought
Clark, Mo.	Clark Auto Co.
Columbia, Tenn.	Columbia Motor & Implement Co.
Connellsville, Pa.	Connellsville Garage
David City, Neb.	Doty Motor Co.
Dwight, Ill.	Short's Garage
Fargo, N. D.	Ball Auto Co.
Fort Wayne, Ind.	H. G. Raymond
Harrisburg, Ill.	Charles V. Parker
Hazelton, Pa.	Adam Eldam
Horicon, Wis.	Hornlein Brothers
Iron River, Mich.	Bishop & Chero
Manhattan, Kans.	Charles H. Lantz
Medicine Hat, Can.	Dominion Motor Machine Co.
Milwaukee, Wis.	Smith-Hoppe Auto Co.
Muskegon, Mich.	W. P. Marshall
Oakland, Calif.	C. C. Eichelberger
Pittsburgh, Pa.	Alpine Motor Co.
Reading, Pa.	D. B. Hoffer & Sons
Rochester, Vt.	F. J. Robinson
Richmond, Va.	Lozier Motor Sales Corp.

TRUCKS

Austin, Tex.	Thomson-Haiff Co.
Birmingham, Ala.	Birmingham Motor Co.
Columbus, O.	Coates Motor Co.
Connellsville, Pa.	Connellsville Garage
Dalles, Ore.	Walther-Williams Hardware Co.
Greenville, S. C.	W. Conway Thompson
Houston, Tex.	Hawkins-Haiff Co.
Kansas City, Mo.	Dalley & Warriner
Lexington, Ky.	Blue Grass Auto Co.

Town	Agent	Car
Salem, Ore.	Chamberlin Brothers	Cole
Sandusky, O.	J. F. Singler	Moon
San Francisco, Cal.	Dillon-Goodwin Co.	Moon
Saskatoon, Sask., Can.	Robert McIntosh	Cole
Sheboygan, Wis.	E. & H. Motor Co.	Mitchell
Sheboygan, Wis.	E. & H. Motor Co.	Regal
Sherbrooke, Can.	J. W. McKee	Kisselcar
Southport, Conn.	Burkley's Auto Station	Lozier
Strong City, Kans.	Jacob Hinden	Cole
St. Johnsbury, Vt.	Percival & Silsby	Kisselcar
St. Louis, Mo.	New York Motor Car Co.	Pathfinder
St. Louis, Mo.	Von Arx Brothers Automobile Co.	Winton
St. Louis, Mo.	T. J. Moss Motor Car Co.	Borland
Taft, Cal.	Jack L. Maddox	Kisselcar
Tampa, Fla.	Prewitt Auto Co.	Moon
Taylor, Tex.	West Coast Auto Co.	Cole
Toledo, O.	Cornelius-Hohly Automobile Co.	Imperial
Traverse City, Mich.	William Goode	Cole
Topeka, Kans.	Vesper & Evans	Cole
Victoria, Can.	Moore & Pauline	Cole
Waterloo, Ia.	Miller Motor Car Co.	Lozier
White Rock, S. D.	Rydell & Hokenson	Kisselcar
Williamsport, Pa.	E. L. Sheffer	Cole
Winfield, Ia.	Nesbitt Auto & Supply Co.	Moon
Winnipeg, Can.	Canadian Motors Co.	Little
Quebec, Can.	Frank Campbell	Cole

Town	Agent	Car
Louisville, Ky.	Cumberland Motor Co.	Federal
Newcastle, Pa.	Edward E. Hileman	Gramin-Bernstein
Pueblo, Colo.	Ideal Motor Car Co.	Federal
Rochester, N. Y.	J. Cunningham	Federal
Sheboygan, Wis.	E. & H. Motor Co.	Chase
Syracuse, N. Y.	A. J. Jackson	Federal
Toledo, O.	Atwood Automobile Co.	Toledo
Toledo, O.	H. B. & W. H. Wilkinson	Federal
Youngstown, O.	Youngstown Carriage Co.	Federal

motor and warns when overheating and accompanying damage is about to take place.

Bartow, Fla.—F. M. Say has bought out the garage and service department of the Joe B. Johnson branch here, while he retains the Buick sales agency.

San Francisco, Cal.—The Dillon-Googwin Co. is the new sales agency for Moon cars in San Francisco. The salesroom is located at 345 Van Ness avenue.

Milwaukee, Wis.—The American Tire and Rubber Co., Akron, O., has established a branch at Milwaukee under the management of Albert Weisskopf. The headquarters are at 252-254 Fifth street.

Los Angeles, Cal.—Buxton & Childs, the Moon agents in Los Angeles, will move into their new building, situated at Pico and Olive streets. Mr. Childs just recently became Mr. Buxton's partner.

Philadelphia, Pa.—The premises at 332-334 North Broad street, lately the home of the American car, have been completely renovated and are now occupied by the Wallace Automobile Co., which recently secured the agency for the Studebaker line. A garage is attached to the rear of the building.

Boston, Mass.—The American and Marion agencies in Boston have been consolidated, following a visit to the Hub by President J. I. Handley, of the American Motors Co. and the Marion Motor Car Co., of Indianapolis. The American-Marion Motor Car Co. has been formed with F. F. Wentworth as president, and Frank L. Roberts, of the Roberts & Sherburne Co., and President J. I. Handley, of Indianapolis, as directors. The Copley square salesrooms of the American has been given up

and the two lines will be marketed from the Marion headquarters at 1002 Commonwealth avenue.

Ellsworth, Wis.—The Ellsworth Auto and Repair Co. has completed the construction of its new garage building, but will continue its old garage until next spring, using the new building for dead storage.

Boston, Mass.—The Myer Abrams Co. of Boston, agent for the Lauth-Juergens trucks, is considering the advisability of invading the New York territory also, this having been offered to the company. If the plans go through sub-agencies will be opened in cities in Massachusetts, Rhode Island and Connecticut between the two larger places.

New York—The Bosch Magneto Co. announces the appointment of the following additional distributing agencies: Johnson-Gewinner Co., 124 Peachtree street, Atlanta, Ga.; Pence Automobile Co., 800 Hennepin avenue, Minneapolis, Minn.; Fry & McGill Motor Supply Co., Denver, Colo.; Dallas A. Shafer & Co., 106 North Eighth street, Richmond, Va.

Los Angeles, Cal.—S. H. Van Nuys has leased for 10 years to J. W. Leavitt & Co., California distributors of the Overland car, the property located on the west side of Olive street, near Pico, with a frontage of 55 feet and a depth of 155 feet. A two-story brick building is being erected. The lease carries a total rental of approximately \$63,000. Another transaction of importance is the lease effected by William C. Keim to I. C. Buxton, agent for the Moon car. A one-story brick will be erected 76 by 145. Another lease recently completed includes the White Car Co., Inc., to Boynton & Goldman, agents for the

Herreshoff car, the salesroom and garage at 810-12 South Olive street.

Minneapolis, Minn.—George H. Richards, secretary-treasurer of the Veeras Motor Co., has resigned to become secretary of the Minnesota Bankers' Association, with headquarters in Minneapolis. He will continue stockholder and director.

Beloit, Wis.—The Beloit Auto and Machinery Co., recently organized at Beloit, has taken over the business of the Fourth Street Garage Co., and will for the present occupy the old quarters at 842-846 Fourth street. Next spring a large new garage and warehouse will be erected.

Buffalo, N. Y.—The Buffalo Electric Vehicle Co. has made an addition to its facilities in Buffalo, having acquired the Buffalo Motor Vehicle Service Co. The latter company has a complete garage and service station at 178 West Utica street, and is closely affiliated with the Buffalo General Electric Co. and the Rochester Railway and Light Co. The property acquired includes the garage and service station located on lands immediately adjoining the factory and service station of the Buffalo Electric Vehicle Co.

Milwaukee, Wis.—The report that the United States Tire Co. would on January 1 establish a direct factory branch at Milwaukee to supersede the state agency held by the Goodyear Rubber Co., 382-386 East Water street, Milwaukee, has been confirmed. On January 1 the company will establish a branch at 454-456 Milwaukee street, and Edward C. Dusold will be in charge as general branch manager. It is stated that the Goodyear Rubber Co. will continue to act as distributor for the G & J division of the United States Tire Co. in the Wisconsin territory.

Birmingham, Ala.—Blacklock Tire and Rubber Co., capital stock, \$3,000; incorporators, K. Blacklock, H. H. Bostick, H. Blacklock.

Boston, Mass.—Blake Spark Plug Co., capital stock, \$100,000; incorporators, F. R. Blake, A. C. Gould, I. Vanderbrook.

Bridgeport, Conn.—Jones Pneumatic Tire Spring Co., capital stock, \$100,000; incorporators, L. D. Jones, E. E. Brandeau, C. R. Hall.

Brooklyn—Bedford Auto Renting & Repair Co., capital stock, \$10,000; incorporators, G. J. Murphy, J. H. Bernstein, A. E. Fuchs.

Brooklyn—Brooklyn Auto Livery Co., capital stock, \$20,000; incorporators, L. W. Boynton, D. B. Hicks, C. M. Fuller.

Buffalo, N. Y.—Buffalo Automobile Sales Corporation, capital stock, \$15,000; incorporators, W. J. Harris, W. N. Heverly, M. MacDonald.

Cambridge, Mass.—E. C. Andrews & Eagles Co., capital stock, \$1,000; to paint cars; incorporators, E. C. Andrews, N. Russell Lyn, C. A. Eagles.

Cincinnati, O.—Ideal Lamp Co., capital stock, \$5,000; to deal in motor car lamps; incorporators, V. E. Shields, H. Faultless, W. C. Klein, R. S. Oppenheimer, E. F. Peters.

Cincinnati, O.—Northway Motor Co., capital stock, \$600,000; incorporator, R. E. Northway.

Clarksville, Miss.—Montroy Ignition Starter Co., capital stock, \$10,000; incorporators, J. M. Montroy, C. L. Montroy, E. M. Fant, E. Fant.

Cleveland, O.—Rutzen Power Co., capital stock, \$100,000; to manufacture motors; incorporators, D. W. Corbin, F. J. Peck, D. H. Tilden, A. M. Snyder, N. I. Young.

Cleveland, O.—R. M. Allen Motor Sales Co., capital stock, \$10,000; to deal in motor cars; incorporators, B. M. Allen, R. M. Allen, H. W. Wiebush, T. B. Logan, H. C. Kagy.

Columbus, O.—Youngstown Automobile Show Co., capital stock, \$1,000; incorporators, W. P. Williamson, J. Van Vaalen, J. A. Henderson, J. W. Kuhns, C. T. Gaither.

Recent Incorporations

Detroit, Mich.—Detroit Autoheater Co., capital stock, \$3,000; to manufacture heaters; incorporators, Oswald Zahn and others.

Detroit, Mich.—Cragg Motor Mfg. Co., capital stock, \$4,000; to manufacture motors and accessories; incorporators, E. F. Allen.

Indianapolis, Ind.—New Miller Carburetor Co., capital stock, \$200,000; to manufacture carburetors.

Jersey City, N. J.—Maccarr Co., capital stock, \$125,000; to deal in motor cars; incorporators, R. Carr, K. Kramlich, C. E. Fisk.

Jersey City, N. J.—Wheel of Fortune Corporation, capital stock, \$600,000; incorporators, L. H. Gunther, H. A. Black, J. R. Turner.

Lawrence, Mass.—Edison Electrical Vehicle Co., capital stock, \$50,000; directors, J. F. Morin, F. A. Lambert, W. F. Leighton.

Morgantown, W. Va.—Chaplin-Dille Motor Car Co., capital stock, \$25,000; to manufacture and deal in motor cars; incorporators, B. M. Chaplin, J. E. Dille, M. Chaplin, M. C. Wildman, O. H. Dille.

Nahant, Mass.—Bay Side Motor and Yacht Club, capital stock, \$25,000; incorporators, A. L. Rowell, W. H. Southwick, W. N. Wright.

Newark, N. J.—Touraine Motors Co., capital stock, \$37,500; motor car business; incorporators, C. H. Van Vleck, Jr., E. M. Dalley, F. N. Kolb.

Newark, N. J.—Best Tire Co., capital stock, \$125,000; to manufacture motor car tires; incorporators, S. L. Henry, M. Walker, E. Spillane.

New York—Vaughan Car Co., capital stock,

\$1,000,000; incorporators, R. C. Thompson, J. Kahn, P. T. Kammerer.

New York—Collier Rotary Valve Co., capital stock, \$100,000; incorporators, J. N. Blair, H. D. Johnson, A. B. King.

New York—Favary Tire Co., capital stock, \$300,000; incorporators, E. Favary, W. P. Richardson, M. W. Brashears.

New York—Buyer's-Seller's Automobile Co., capital stock, \$5,000; incorporators, I. J. Cohn, J. H. Preston, M. Gross, S. A. Fried.

New York—George J. Stier, capital stock, \$5,000; to build trucks and motor cars; incorporators, G. J. Stier, J. J. Reed, M. A. Stier.

New York—Columbus Circle Auto Co., capital stock, \$500; incorporators, M. Belckert, E. Rosenberger, W. J. Leimer.

New York—S. & M. Motor Co., capital stock, \$10,000; incorporators, E. E. Strobel, W. C. Martin, R. W. Freeman.

Oroville, Cal.—Chico Garage Co., capital stock, \$10,000; incorporators, E. S. Sauber, T. H. Morgan, S. P. McLellan.

Patchogue, N. Y.—Patchogue Garage Co., capital stock, \$1,500; incorporators, J. A. Udall, Jr., H. J. Lawrence, J. A. Udall.

Port Chester, N. Y.—Nelson's Garage, capital stock, \$1,000; incorporators, F. Nelson, M. Nelson, J. Colantonio.

Richmond, Va.—Warner Speedometer Corporation, capital stock, \$11,000,000; incorporators, J. E. Hauronic, H. S. Perrigo, V. Flippin.

San Antonio, Tex.—Motor Car Supply Co., capital stock, \$5,000; incorporators, C. P. Guthrie, H. B. Lyne, J. Harrison, W. Harrison.

Somerville, Mass.—Caverly Automobile Co., capital stock, \$5,000; incorporators, I. C. Caverly, W. A. Thibodeau, E. C. Caverly.

St. Louis, Mo.—Waverly Sales Co., capital stock, \$5,000; incorporator, F. E. Stevens.

St. Johnsville, N. Y.—B. & C. Auto Co., capital stock, \$3,000; incorporators, G. F. Bierman, S. V. Christman, C. A. Bierman.

Yonkers, N. Y.—Colonial Taxi-Service Co., capital stock, \$3,000; incorporators, A. L. Barnmore, E. S. Miller, J. L. Barnmore.

PALMER SINGER "BRIGHTON SIX"



\$2000

We are the Third oldest manufacturer of sixes in America today. Our Brighton Six was, and is still, the only high grade six selling under \$3000.00 that is built by a Pioneer builder of sixes. This is the third successful season for this model.

Every Palmer-Singer car is backed by our famous One Year Guarantee.

Dealers and Purchasers, do you know what our Guaranteed Service means to you?

We will not exhibit at any Automobile Show.
Our full line of cars will be on exhibition
at our New York and Chicago Branches.

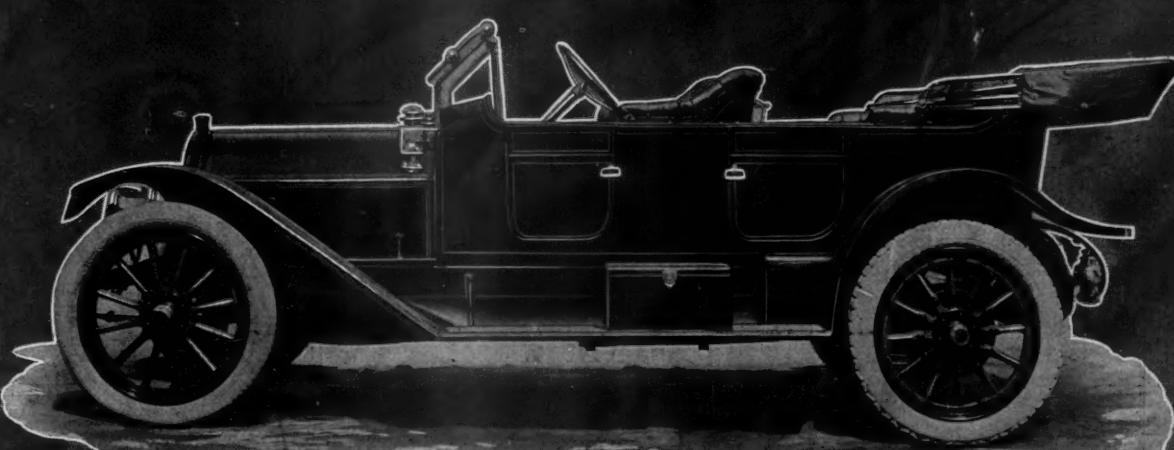
PALMER & SINGER MFG. CO.

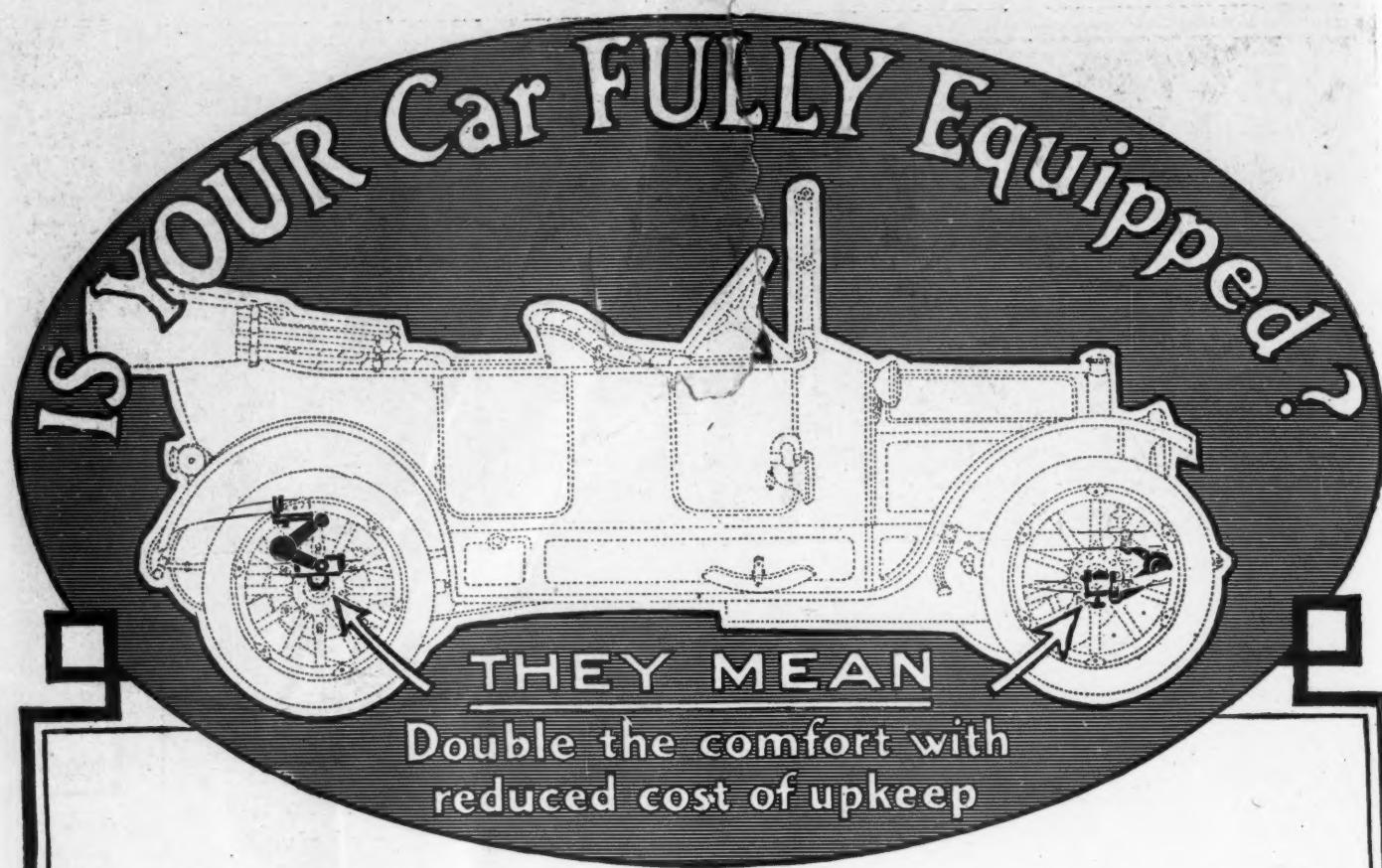
NEW YORK
1620 BROADWAY

Queens, New York City

CHICAGO
2638 MICHIGAN AVE.

Licensed under Dyer Patents 885, 986 and 921, 963.





CONSTRUCTIONALLY, the automobile has reached a stage of development which leaves little to be desired. Its builders are now concentrating their attention on equipment which has become a matter of supreme importance. Accessories which add to the *comfort and luxury of motoring* are being generally adopted as *regular equipment*. Years before accessories were even seriously considered, the

Truffault-Hartford SHOCK ABSORBER

was regular equipment on most of the best known American cars, because it has always been considered more in the light of a *necessity* than an *accessory*. Today such cars as these are *factory-equipped* with Truffault-Hartford Shock Absorbers:

PACKARD
ALCO
MARMON
STEVENS-DURYEA

NATIONAL
MERCER
OLDSMOBILE
THOMAS

BENZ
FIAT SIX
HUDSON SIX
CHADWICK

PREMIER
STODDARD-DAYTON
CORBITT
MFARLAN SIX

COLUMBIA
METALLURGIQUE
BRUSH
AMERICAN 50
NYBERG

A car is not *completely equipped* if it is not Truffault-Hartford-equipped. You will realize this as soon as you ride on a set. For *comfort*, for *economical upkeep*, for *real immunity from spring breakage and from excessive tire ills*, the Truffault-Hartford is *indispensable*. Ask any of the 200,000 and more motorists now using it.

There's a set for your car and a blueprint showing how to put it on.

HARTFORD SUSPENSION COMPANY

EDW. V. HARTFORD, President

Main Offices and Factory, 144 Bay Street, Jersey City, N. J.

BRANCHES

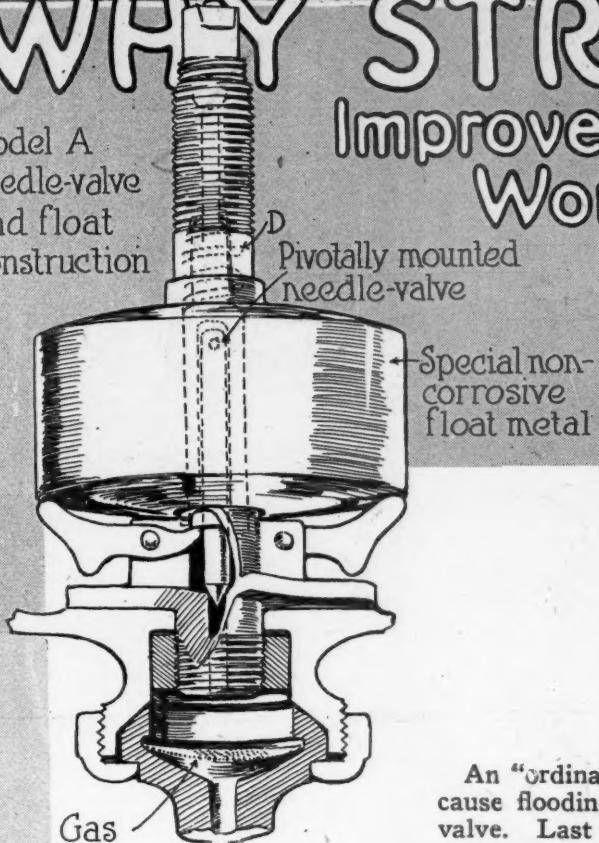
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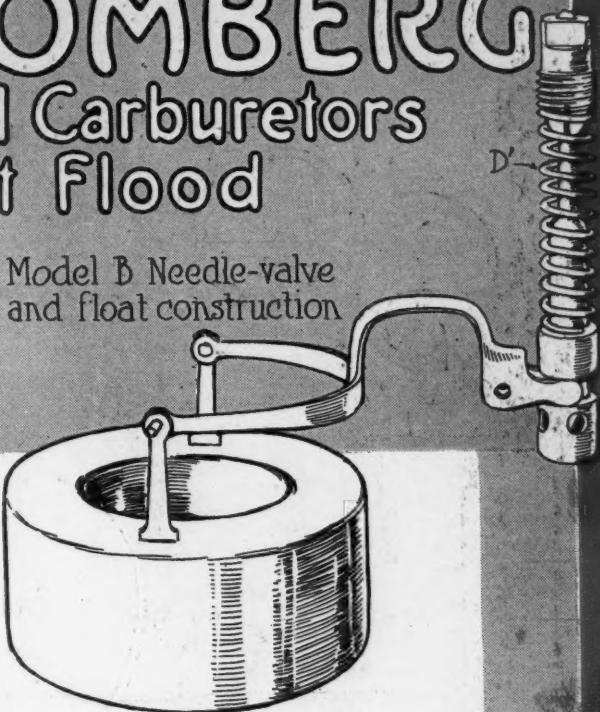
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WHY STROMBERG Improved Carburetors Won't Flood

Model A
Needle-valve
and float
construction



Model B Needle-valve
and float construction



An "ordinary" float with coarse adjustments will cause flooding as readily as a "low-proof" needle-valve. Last week's "Reason Why" Talk brought to light the fact that more time and brains were focused upon the construction of STROMBERG Needle-valves alone, than were spread over the entire building of some instruments.

This Talk is upon "puncture-proof" floats and sensitive adjustments. STROMBERG Improved Carburetors won't flood because their floats are metal and invulnerable. They cannot become "dropsical"—"water-logged"—and consequently upset the delicate needle-valve adjustments with which they are so intimately connected. STROMBERG Floats never change in weight.

ALL STROMBERG Floats are made by an exclusive process, of special float-metal. Each separate float is "proved" by specially designed testing instruments. Each float is weighed on scales as sensitive as a jeweler's, and a discrepancy of grains in weight is sufficient to throw any float out as "not up to standard." This is the reason that once the gasoline level is set at the factory, the STROMBERG Float Chamber need never thereafter be disturbed.

STROMBERG Improved Carburetors won't flood because of the "hair-fine" nicety of balance between the weight of the floats and the springs (D and D')—springs made of imported steel wire and given an individual tension test on every carburetor assembled. These springs exactly counter-balance the weight of the needle-valve, keep it from jolting up and down—in that manner prevent flooding.

These are "reasons why" it is mechanically impossible for STROMBERG Improved Carburetors to flood.

Next week will appear, "Why STROMBERG Improved Carburetors Make Winter Starting Easy." Your name and address sent us on the back of a post-card will bring you all "Reason Why" Talks issued to date.

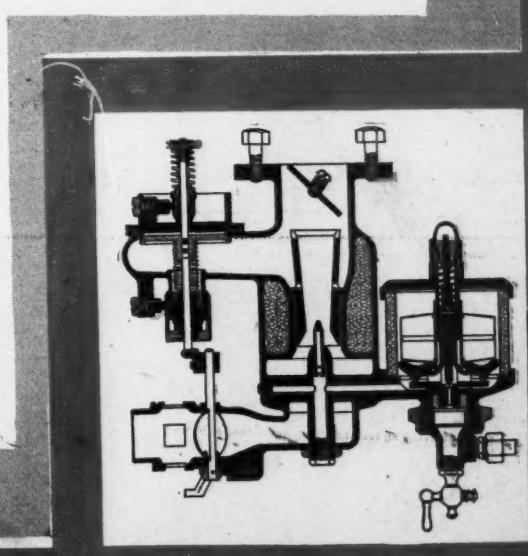
"Reason Why" Talk 1-B

Look for our exhibits at the New York and Chicago Shows

**Stromberg Motor Devices
Company**

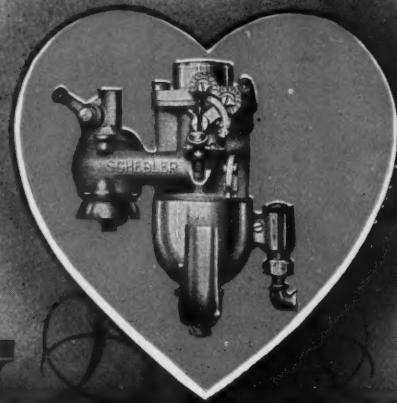
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SCHEBLER

*The Aristocrat
of Carburetors*



"The Heart of the Automobile"

WHEELER & SCHEBLER
"Pioneers in Perfection" of Carburetion
MANUFACTURERS
INDIANAPOLIS U.S.A.

THE SCHEBLER IS THE ACKNOWLEDGED
STANDARD CARBURETOR OF THE WORLD

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Service Department

Distributors

Every city and town in
the United States and
Canada • Europe and
Australia

Level-Headed

AS REGULAR EQUIPMENT

**Check
this list
of cars
equipping
with our
warning
signals:**

A. E. C.	Flanders	Orson
Alco	King	Pope Hartford
Armleder	Knickerbocker	Pierce-Arrow
Autocar	Knox	Pratt
Babcock Electric	Lozier	Simplex
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Bailey	Metallurgique	Sternberg
Benz	Michigan Electric	Stevens-Duryea
Borland Electric	Multiplex	Stoddard-Dayton
Broc Electric	Nance	Stover
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F.I.A.T.		

AS SPECIAL EQUIPMENT:

Cole

Hudson

Packard

See how it practically includes every high priced car—conclusive proof that level-headed makers today know that their cars must be complete—with all accessories that make for comfort and safety.

And furthermore: that only those accessories everywhere recognized as Standard—irrespective of cost—will be accepted by the motorist.

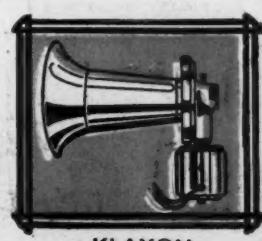
All high grade cars—with but very few exceptions—are today Klaxon-equipped. Partly because the bulb horn is commonly known to be thoroughly inadequate; principally because the Klaxon is Standard and because the mere mention of its name means to the car buyer: "the best signal it is possible to buy."

Only one or two makers of high priced cars today are saying: "We will consider the Klaxon for 1914" or "We won't equip until our customers make us."



Lovell-McConnell Mfg Company Newark, N.J., U.S.A.

KLAXON

"The Public Safety Signal"



National



Money Cannot Buy Better Materials Nor More Elegant and Completely Equipped Car

Long stroke (4 $\frac{7}{8}$ x 6) flexible and noiseless Motor with enclosed valves.

Left Side Drive.

Center Control.

Gray & Davis Electric Starter, easily operated by simply touching a button with foot.

Gray & Davis Dynamo Electric Lighting System.

Bosch dual double Magneto.

12-inch Turkish Upholstery.

Full heavy nickel Trimmings.

Electric Horn.

Adequate Baggage-carrying Compartment concealed in body but easily accessible.

Powerful and reliable Brakes.

Spacious Interior.

Tire Pump, integral part of the motor. Inflates a tire in three minutes.

Truffault-Hartford Shock Absorbers on rear.

128-inch Wheel Base.

Gray & Davis 12-inch black and nickel bullet head lights.

Adjustable, ventilating and rain vision Wind Shield.

Multiple jet Carburetor.

Hoffecker steady-hand Speedometer.

Tire Carrier in rear.

Silk mohair Top, Cover and Curtains.

Full-floating Rear Axle.

Resilient Springs, $\frac{3}{4}$ Elliptic in rear; Semi-Elliptic in front.

Large gasoline pressure-feed Tank with Gauge in rear.

Robe Rail and Foot Rest.

Foot Mat in Running Board.

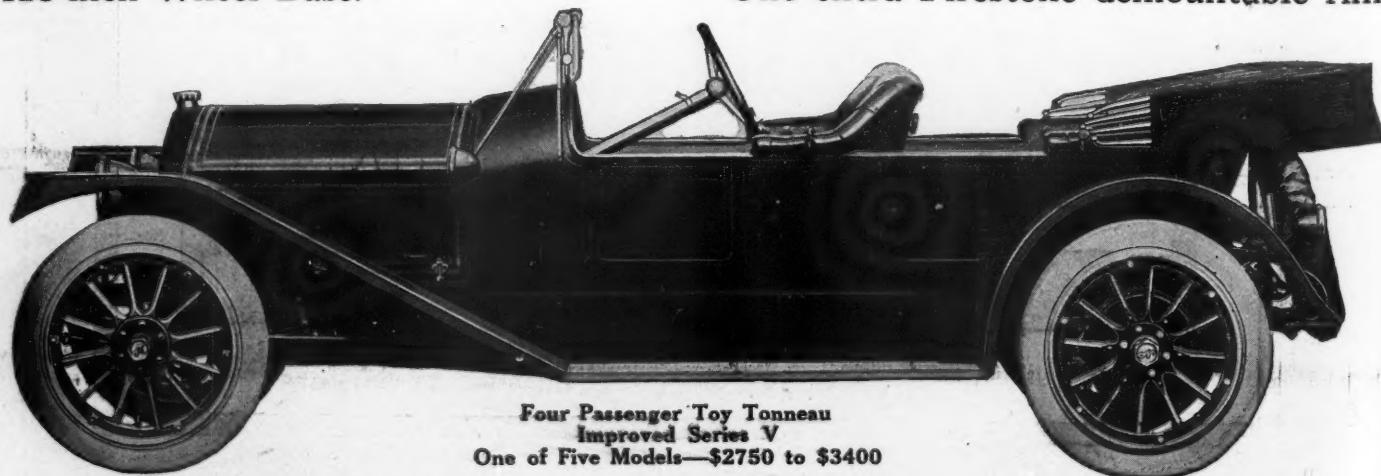
Plain, continuous enclosed Metal Guards.

Easy riding qualities, unexcelled.

Oiling System, demonstrated to be only perfect oiling system.

Tools and jack in box concealed by splash on running board.

One extra Firestone demountable rim.



Four Passenger Toy Tonneau
Improved Series V
One of Five Models—\$2750 to \$3400

NATIONAL MOTOR VEHICLE COMPANY, Indianapolis, Ind.

When Writing to Advertisers, Please Mention Motor Age.



JUST PAWS

Hands were not intended for pawing around in dirt and mud. Yet that's what they must do when cranking a car in the old way. Do you like it?



Storage Batteries

with Electric Starting Outfits afford relief from cranking troubles and will also light your car. Just a push of the button to do either. But, examine the Battery and

BE SURE IT'S AN



Use Class A **GLBA** Battery with an Electric Lighting Generator
 Use Class B **GLBA** Battery with an Electric Self-Starter

Write us for full information

Willard Storage Battery Co.
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New York Branch: 136 W. 52d St.

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WE OFFERED NOTHING UNTIL WE KNEW
WE HAD THE BEST



H M S
SPARK PLUGS

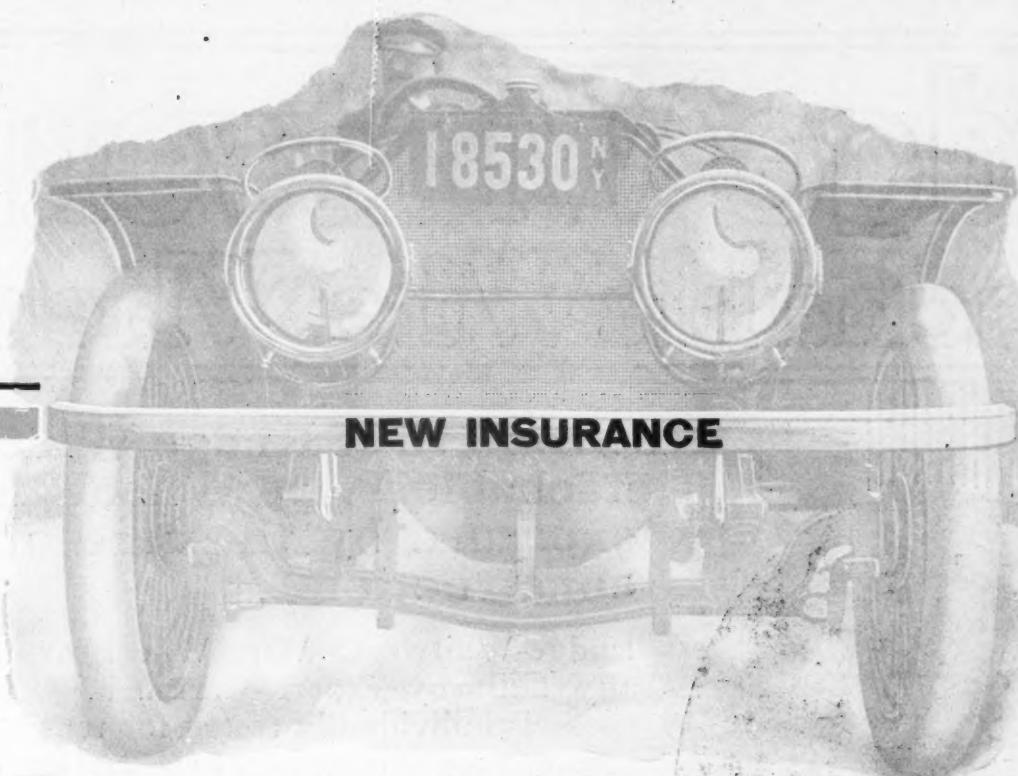
For nearly forty years our products have
been recognized everywhere as *standard*
and of the *highest grade*.

The H. M. S. Bull Dog Spark Plug main-
tains this reputation in still another field.

THE HARTFORD MACHINE SCREW CO.
HARTFORD, CONN.

NEW YORK Office and Warehouse
88-90 Walker Street

DETROIT Office and Warehouse
878 Woodward Avenue



NEW INSURANCE

The best way to insure the vital, costly, front parts of your car is to prevent the damage altogether—not to collect for it after it is done.

No delay then while your car is in the repair shop; no loss in dollars outright if the appraisement of damage done falls below \$25.00.

The Conover Safe-Guard protects these parts—*absolutely*.

It is a broad, massive channel-bar supported at four points by sturdy, semi-elliptical springs of finest chassis steel.

Before a lamp, fender, radiator, axle or spring can even be scratched, this powerful barrier must be broken.

The makers back the Conover Safe-Guard with an *unreserved* guarantee—a re-

placement free if broken any time within a period of two years.

Don't compare the Conover with the ordinary "pipe" bumper. It is a *new* protection—new in sightlessness as well as in strength.

You cannot completely and satisfactorily insure your car without the Conover Safe-Guard.

Your car is worth it.

Best quality of steel
heavily enameled in **\$15.00**
black, royalblue, French
gray or maroon; bar 2 inches wide.
(Any other color of enamel \$5.00 extra)

Best quality of steel,
brass or nickel plated; **\$17.50**
bar 2 in. wide
Shipped, express paid, anywhere in the United States, on thirty day's trial, upon receipt of the regular price. When ordering, give name and model of car. Specify size and finish desired.

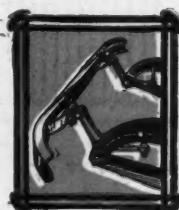
Solid bronze, finished in
either brass or nickel; **\$25.00**
bar 2 in. or $2\frac{1}{8}$ in. wide

An attractive booklet will be sent free upon request.



LOWELL-McCONNELL MFG. COMPANY
Sellers, 75 Newark, N. J.

NEW JERSEY TUBE COMPANY
Welders, 75 Newark, N. J.



CONOVER
The Dependable Safe-Guard

Rudge-Whitworth Detachable Wire Wheels

THE Strength of Rudge-Whitworth Detachable Wire Wheels is only exceeded by the care of their construction.



Rudge-Whitworth Wire Wheels are scientifically built by expert workmen. Every wire spoke is individually tested for tensile strength before it is put into the wheel. After the assemblage is made, each spoke is again tested to find the tension to which it is being subjected. Nothing haphazard, hit-or-miss about Rudge-Whitworth construction. Every detail is carefully and exhaustively worked out by men who have spent their lives in the manufacture of wheels.

This is why our famous wire wheels survive shocks, that shatter artillery wheels.

This is why the leading manufacturers at home and abroad are using Rudge-Whitworth Wire Wheels, as standard equipment in preference to all other makes of Wire Wheels

These indestructible wheels are now being manufactured, under Rudge-Whitworth Patents, by the Standard Roller Bearing Company of Philadelphia.

Equipped with Houk Quick Detachable Rims—the only REAL detachable rim on the market.

Absolutely Rustless

George W. Houk Company
5002 Lancaster Avenue, Philadelphia, Pa.

REXO

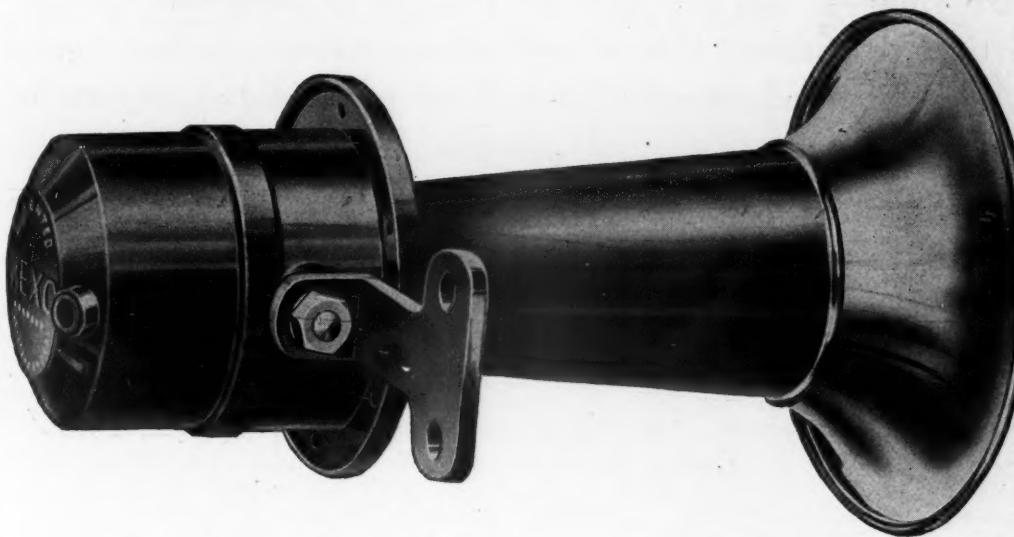
\$8

A HORN THAT HELPS SELL CARS

"Although the time may never come when the accessories that constitute the equipment of a car will of themselves sell cars, the fact remains that the item of equipment now is being made so much of that he who does not turn it to advantage is permitting good 'ammunition' to go to waste. The manufacturer of the device has widely advertised it and built up a reputation, and because it is a good device the manufacturer of the car and the dealer also advertise it—if they are wise—for they realize that in linking the name of a well-known and well-tried product with the name of their car a certain prestige thereby is added to the car."

—Extract from Editorial in *Motor World*, Nov. 28, 1912.

\$8



We have already sold over 65,000 REXO Horns for 1913 cars. When you see a REXO on a car it means that the maker of that car is willing to hitch up his car's reputation with REXO reputation and take our word for it—every car carrying the REXO is a good car.

The many car manufacturers who will use the REXO as standard equipment for 1913 are not doing so because of our advertising but, knowing that to some extent a car is judged by its accessories, they put the REXO through most gruelling tests and then adopted it because it made good in actual service, had an attractive appearance and required no attention from the user.

If the car carries a REXO as regular equipment it is a good car.

*We can supply JOBBERS and DEALERS now with
the first reliable electric signal at a popular price.*

THE DEAN ELECTRIC COMPANY

338 Taylor Avenue

Elyria, Ohio

"Look for Dean where Quality's seen"

Airease

THE MOST WONDERFUL AUTOMOBILE INVENTION OF THE AGE

Scientists and motorists are looking with amazement at the invention that is to revolutionize automobile traction.

It has taken us three years to convince ourselves that Airease unquestionably contains the characteristics that are necessary for a perfect tire filler—a perfect tire filler must be soft and spongy, at the same time so resilient that it will always return to its original position—it must be a substance that will not be affected by heat or cold, that cannot disintegrate under constant fluctuations of pressure, and that cannot shrink, compress or harden through years of automobile tire service. This seemed an inventor's dream.

Airease was discovered three years ago by a very famous chemist, and while other so-called inventors of tire fillers were ruthlessly pillaging the motor industry with attempts at tire fillers, the backers of Airease were testing, trying and proving on hundreds of cars over thousands of miles.

The men behind Airease are all men of large financial means and nationally recognized business integrity. Airease is no "fly-by-night" or "get-rich-quick" scheme,

nor is it any attempt to compete with the substances heretofore known as tire fillers.

Airease is so marvelous an invention and gives such great utility, economy and comfort that it should be known to every motorist. We therefore inaugurate the biggest advertising campaign ever used for plain educational purposes, and we do it with the intention of relieving a million motorists of the discomfort of pneumatic tires.



If you are not entirely satisfied with the resiliency of Airease, or if you are dissatisfied with it for any reason whatsoever, we will not only return the full purchase price, but we will present you with a new set of inner tubes.

WATCH

**The Business Possibilities
of Introducing Airease to
the Motorists of Your
District Cannot be Over-
estimated. Just Name the
Territory and We Will
Show You in Figures What
Airease Means to You.**

*The day when a little
glue, glycerine, water,
chalk, etc., could be concocted
by a charlatan
and sold for tire filler
has passed—thanks to
the science of Airease.*

It's a satisfaction to do business with a big, sound organization of unlimited financial means that is marketing a product of unquestioned value.

But can you conceive of a greater opportunity than that offered by the much needed Airease? There are a million automobiles in the United States and almost all of them are supported on troublesome pneumatic tires. Those who have seen the marvelous achievements of Airease in the past three years, and there are thousands of cars now running on Airease, freely prophesy that within the next two years 50% of all the pleasure and commercial cars in the country will be supplied with Airease.

For indeed Airease is a *marvelous substance*. Samples of it have been exposed to the air for two years through summer heat and winter cold, and yet the slightest change in its condition, in its bulk, or in its resiliency cannot be detected. In actual use in tires Airease shows like results.

Casing after casing has been worn out over one inner tube filled with Airease and not the slightest change has taken place within the inner tube. Those who have used pneumatic tires ever since the early days of the automobile cannot detect the slightest difference between riding on Airease and riding on compressed air.

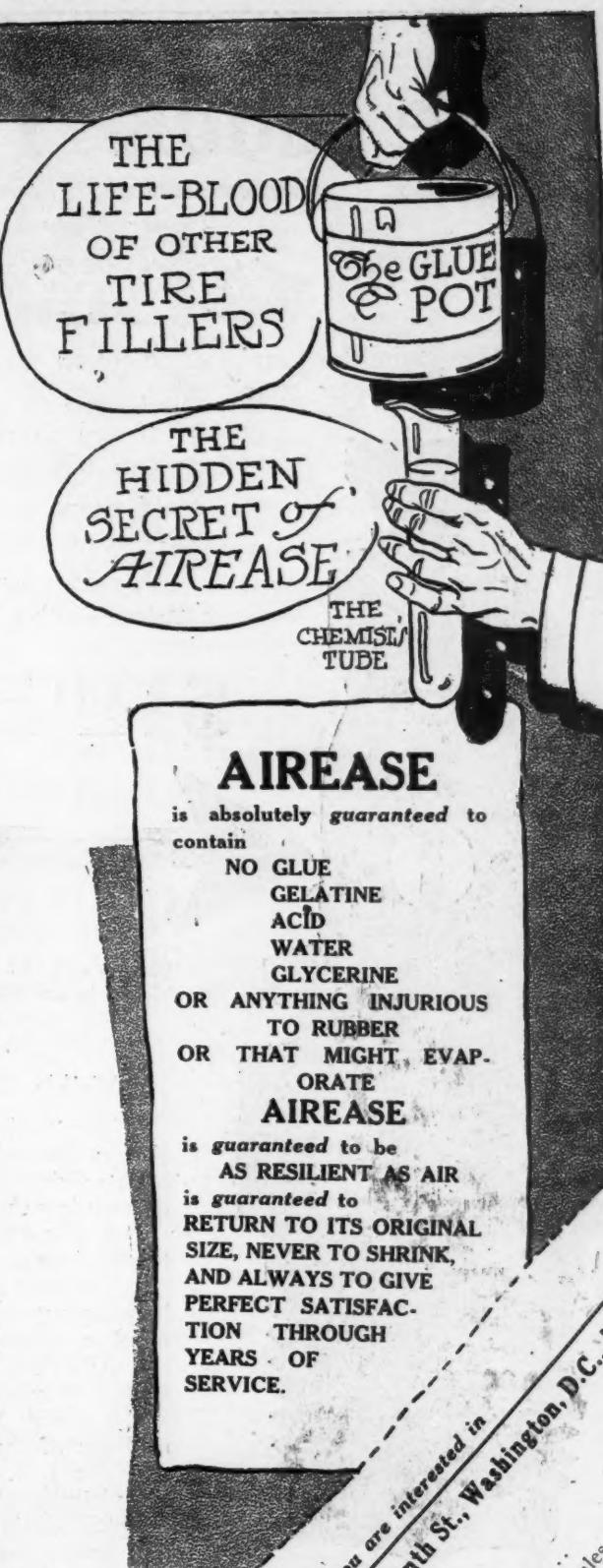
Automobiles have stood for many months on tires filled with Airease and when the wheels were turned not the slightest flattening of the Airease tube could be detected. In fact Airease will always return to its original size and shape.

If you are interested in making money in the automobile business, there never was a finer chance. The motorists in your neighborhood are right now reading our big advertising campaign, and before it is finished every motorist in America will be thoroughly familiar with Airease.

We are now placing filling stations in all parts of the country and we will be glad to explain to you what one will cost in your territory. We are receiving inquiries now from everywhere and we hope that you will be successful in getting your territory.

AIREASE TIRE FILLER COMPANY
Cor. 14th and Pennsylvania Ave., Washington, D. C.

THESE ADS.



Mark with X proposition you are interested in
AIREASE TIRE FILLER CO., 501 Fourteenth St., Washington D.C., M.A.
Gentlemen: I am interested in Airease.
My tire sizes are Front Rear.
Airease in this territory.
Name:
Street:
City:

One Look Tells Everything

The



Visible Spark Plug lays bare all ignition troubles

The "visible gap" is an open "window" giving you a full view of the internal workings of your spark plug.

If the spark is seen jumping the gap, look for your trouble between the gap and sparking point.

If there is no spark in the gap, your trouble is behind the plug—in magneto, or batteries, or coil, or wiring.

But for the "visible gap" it would take you many precious minutes—often hours—to locate the seat of trouble.



\$1.00

Buy this
great new
Spark Plug

Dealers will find J. D.
Visible in greatest demand

Indicates in which way trouble lies.

Facilitates timing of engine.

Intensifies spark in cylinders.

Consumes only minimum current.

Gap adjustable—can be closed entirely.

Permits regulating spark for any cylinder.

By widening gap plug cleans itself.

Costs same as any good plug.—\$1.00

Visible Idea Worked Out Perfectly for the First Time

The "visible gap" feature, so far as being incorporated in a plug, has always seemed as far away as perpetual motion. The visible feature has been marketed in a separate device for years, but this is the only plug embodying the visible feature in a practical manner.

It is simple. Merely a hole in the porcelain and a spiral action to regulate length of the gap in the central electrode which carries the current.

The hole in no way lessens the strength of the plug, and the current in jumping the "visible gap" loses none of its efficiency. On the other hand it intensifies the spark at the gap in the cylinder.

Additional prestige is lent the J.-D. Visible Spark Plug by the fact that it is being introduced by the largest manufacturers of spark plugs in the world. We are exclusively manufacturers of spark plugs; we make millions of them each year.

The J. D. Spark Plug was a famous plug before it was improved by the visible feature. It combines finest workmanship, best materials and simplest designs.

Every part of this plug is made in our factory—even the porcelain being produced in our own potteries from clays and other ingredients imported from Europe.

This unequivocal guarantee goes with all our spark plugs:

"Your money back or a new plug if you are not satisfied."

If your dealer hasn't the J.-D. Visible yet, send your money direct to us for a set, SPECIFYING SIZE WANTED AND MAKE OF MOTOR, and we will ship them postpaid. Remember, the J.-D. Visible Plug is only \$1.00. Write today for our literature on ignition. It is free.

Jeffery-Dewitt Company, 551 Butler Ave., Detroit, Mich.

MERCER

ANNOUNCING

Type 35, Series G, Four-Passenger Type 35, Series H, Five-Passenger
 Type 35, Series J, Raceabout Type 35, Series K, Runabout

A NEW series of Mercer cars that appeal directly to the Motorist who realizes that bulk and weight are no longer essential in a motor car of the highest type. The Mercer is the "happy medium" car—neither too heavy nor too light.

Power, strength, durability, consistency of performance, comfortable riding qualities, graceful appearance, up-to-the-minute appointments, and real legitimate dollars-and-cents value, are what influence wise buyers in their choice of a car. Measured by this standard the Mercer is recognized as leader of the medium-weight class.

Pronounced features are high efficiency motor, perfect lubricating system, reliable steering gear, large and perfectly balanced crank shaft, four-speed transmission, foot brake operating on transmission, springs that give real riding comfort, two-spark Bosch magneto of enclosed type, Rushmore electric lighting and starting systems, both separate units and operating independently of ignition, distinctive and exclusive body designs.

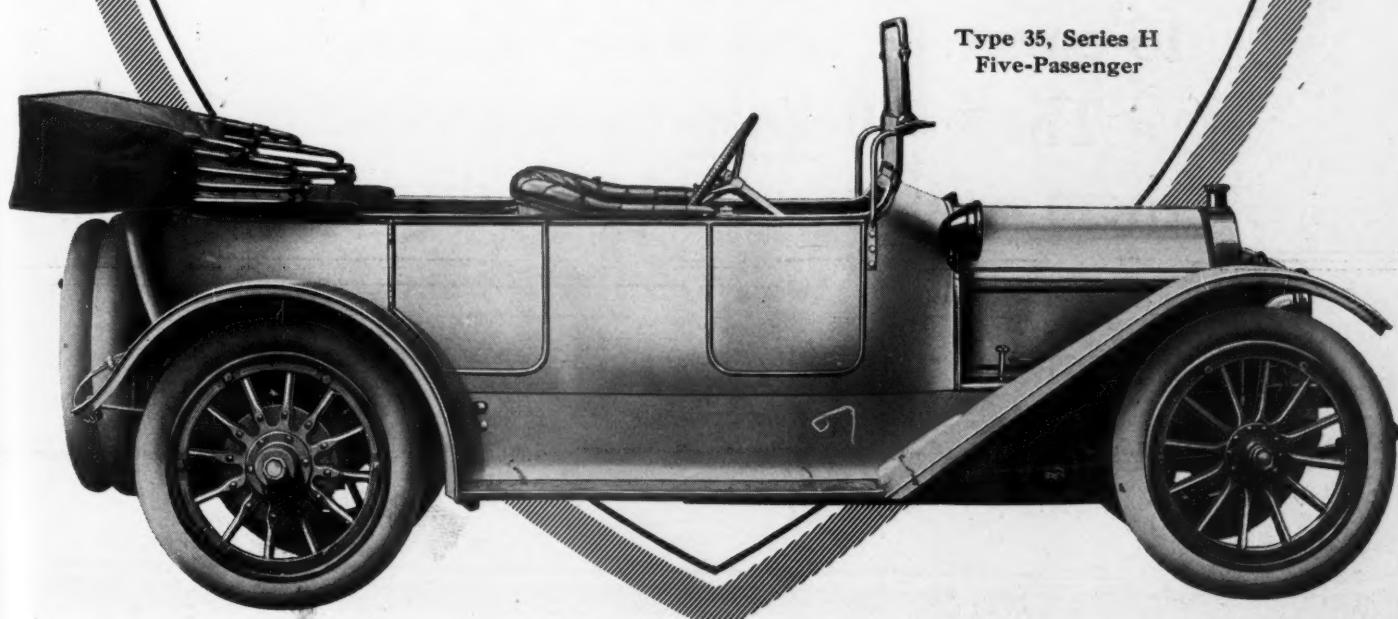
Prices: \$2600 to \$2900

Descriptive Literature Sent on Request

MERCER AUTOMOBILE COMPANY

800 WHITEHEAD ROAD, TRENTON, N. J.

Type 35, Series H
Five-Passenger



When Writing to Advertisers, Please Mention Motor Age.

Don't Miss the Show Issues

FORTY thousand motor owners and motor dealers are waiting for the big Show numbers of MOTOR AGE and THE AUTOMOBILE.

The show issues are part of the show itself—a compact digest of everything the industry has produced in the past year.

These forty thousand intelligent and motor-wise readers will be unusually interested in the Show issues.

They will absorb them from cover to cover.

They will keep them and refer to them as they would to a directory.

And they will be impressed by the splendid big advertisements of the

leading manufacturers in every branch of the industry.

Don't you think your "ad" ought to be there, too?

Wouldn't you like to tell your selling story in a big way to the right people at a time when they are most interested?

Only a few days left!

*The Special Show Issues of
MOTOR AGE and THE AUTOMOBILE*

New York Show issue, Jan. 9

New York Show issue, Jan. 16

Chicago Show issue, - Jan. 30

Chicago Show issue, - Feb. 6

THE CLASS JOURNAL CO.

**910 S. Michigan Ave.
CHICAGO, ILLINOIS**

**239 West 39th St.
NEW YORK, N. Y.**

KOEHLER COMMERCIAL CAR

CARRYING CAPACITY 1600 LBS. \$750. PRICE

DOUBLE PROFIT—CUT EXPENSE

THAT'S WHAT THIS CAR WILL DO FOR YOUR BUSINESS



OPEN FLARE-BOARD TYPE

Large and roomy. Inside measurements, 44 inches wide, 84 inches back of driver's seat to rear. Flare-boards, 17 inches above floor. Strongly ironed throughout, also ironed to receive four-post canvas top, which can be had from stock at \$40 additional. **CAPACITY**, 1600 lbs. **PRICE**, \$750. Various types of bodies are obtainable. The Panel Type B is an unusually handsome job. Price \$150 extra. Inside measurements: 42 inches wide, 53 inches from floor to top, 84 inches back of driver's seat to rear. Canvas side body similar in appearance to Panel Type B—\$50 extra.

SPECIFICATIONS

MOTOR—2-cylinder opposed, 22-24 H. P. Lubrication mechanical and integral with motor; 300 miles one supply of oil.

COOLING—Thermo-syphon system.

IGNITION—Bosch High-Tension Magneto. No batteries or coil needed.

CONTROL—Left hand, throttle lever on steering column.

DRIVE—Direct line double universal joint with jack shaft. Final drive from jack shaft to rear wheel sprocket through double side chains.

TRANSMISSION—Planetary type. All gears genuine chrome nickel steel, hardened throughout.

BRAKES—Service brakes on jack shaft. Emergency brakes simple in design, extraordinarily powerful, operated independently.

TIRES—2 in. Solid Rubber.

TREAD—58 in.

CAPACITY—1600 lbs.

WHEELBASE—85 in. Wheels—36 in. front, 48 in. rear.

SPEED—4 to 16 miles per hour.

PRICE—\$750 to \$900, depending on body equipment.

OIL TIGHT CASE—In which transmission, differential, bevel gears and metal to metal clutch run in a CONSTANT OIL BATH. 1,000 miles with one supply of oil.

THIS IS THE FACTORY

"Built in Newark, N. J."



Address all correspondence to

H. J. KOEHLER

S. G. CO., 1709 Broadway, New York, N. Y.

The KOEHLER Commercial Car delivers merchandise at less cost per pound per mile than any other known method of transportation, thereby cutting expense. It offers maximum capacity for minimum price, therefore doubling your profits. A very attractive proposition for dealers.



SCIENCE Supports our Claims

The WARD LEONARD SYSTEM

The Ward Leonard automatic dynamo lighting and starting system of to-day is fundamentally and scientifically correct. It is perfect both mechanically and electrically.

What the electrical engineers knew to be right and standard, we used in our systems. What they did not know, we showed them, and today the Ward Leonard Lighting and Starting System has the approval of experts, the support of science and the commendation of users.

Our lighting and starting system is automatically perfect, is simple, light in weight and *it does not go wrong*.

**WARD LEONARD ELECTRIC CO.
BRONXVILLE, N. Y.**

103

WARD LEONARD

AUTOMATIC
SYSTEMS CONTROL

Lighting - Starting

Let Motor Age Remind Him of Your Holiday Good Wishes Once a Week

C Your friends, your relatives, your employees—all interested in motoring—will appreciate a remembrance that is as brimful of interest as it is of *practical* information—something that *teaches* at the same time it *delights*.

C Such a Christmas or New Year's Greeting is MOTOR AGE.

C 52 times a year—once every week—it reminds the recipient of your good-will. It permits neither the gift nor the giver to be forgotten.

C \$3 a year is all it costs—and on that small investment it pays 100% dividends in friendships maintained and knowledge gained.

C Join the Society for the Prevention of Useless Giving by sending him Motor Age *this* year.

C All subscriptions will be acknowledged to the recipient with suitable Holiday Greetings sent him in your name.

C Send your subscriptions to Mr. Ferguson, our Circulation Manager, that your request may be given personal attention.

Motor Age

910 South Michigan Ave. Chicago, Ill.

Rayfield

Light Six

1913

The Master Achievement of Wm. Rayfield and His Brothers

The Rayfield Brothers are known the motor-world over as the designers of the most economical, efficient carburetor on the market.

The Rayfield Light Six is the product of these master-engineers. This to motorist and dealer is all the recommendation for downright perfection the Rayfield Light Six requires.

The Rayfield Light Six weighs 1,000 lbs. less than any so-called Light Six (water cooled) in its price class. It is a feather-weight car of the sturdiest, most durable construction—negotiating 15 miles to a gallon of gasoline, 7,500 miles to a set of tires, 1,000 to 1,200 miles on 3 gallons of lubricating oil.

Dealers: Here's the Lightest Water Cooled Six Manufactured

Because of its unequalled lightness—its operation costs practically one-half that of a heavy "Six"—the Rayfield hits every motorist in the pocketbook—answers an actual demand—puts every Rayfield dealer in position to clinch a sale with every Light Six prospect in his territory. Our output for 1913 is dangerously near to being oversold. A few more high class dealers can be accommodated. Immediate action is necessary. Write or wire us.

SPECIFICATIONS:

Wheel-base: 117 inches.

Power Plant: Rayfield 6-cylinder T-head type, 30 H. P. long-stroke motor ($3\frac{1}{2} \times 5\frac{1}{2}$), all working parts enclosed, valve stems run in film of oil. Coventry Silent Chains in Timing Gear Case.

Ignition: Mea High-tension magneto.

Cooling: Water, Thermo-Syphon system; radiator capacity 9 gallons.

Carburetor: Rayfield, air-jacketed.

Clutch: Multiple-disc running in oil.

Transmission: Selective type, 3-speeds forward and reverse.

Front Axle: "I" beam.

Rear Axle: Full-floating.

Springs: Semi-elliptic front, $\frac{3}{4}$ elliptic rear.

Wheels: Schwartz.

Brakes: Internal and external expanding and contracting.

Lubrication: Hollow crank-shaft, force feed with pump—oil strainer attached.

Equipment: Mohair top, dust cover, clear vision windshield, speedometer, demountable rims, one extra, 34x4 tires front and rear. Cast aluminum head, side and tail lamps, all electrically lighted by dynamo. Electric starter. Tools, jack, etc.

Weight: 3,000 pounds.

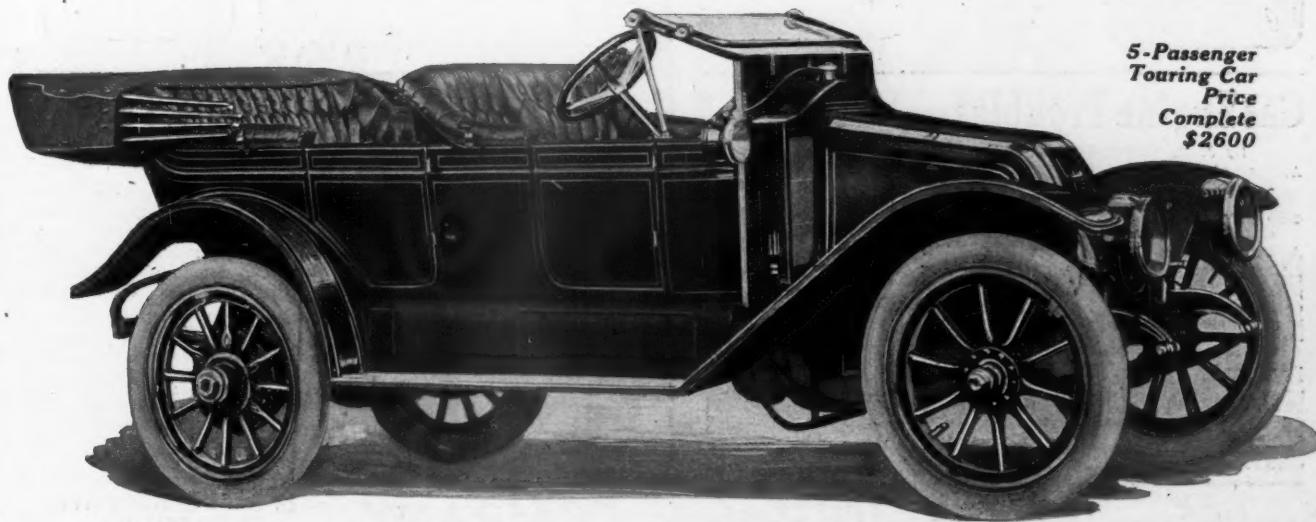
Prices: 5-passenger touring \$2600

4-passenger Torpedo Type 2600

2-passenger Roadster 2600

3-passenger Coupe 2750

RAYFIELD MOTOR SALES CO., 5207 Delmar Boul., St. Louis, Mo.

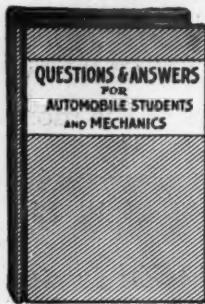


ANY BOOK ON THIS PAGE SENT FOR \$1.50 PREPAID

Questions and Answers

For Automobile Students and Mechanics

By THOMAS H. RUSSELL.
A book of 600 Questions and Answers, adapted for teaching School, the Machinist or before the Board of Examining Engineers. This is the largest, the latest and most authentic book of its kind upon the market. Prepared especially for Home Study. 150 pages. Bound in flexible Covers—In fact it is a regular text book.



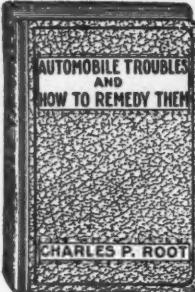
Automobile Troubles and How To Remedy Them

By CHARLES P. ROOT, Former Editor
"Motor Age."

Pocket size—5 x 7 inches, 225 pages, illustrated, handsomely bound in red flexible leather, round corners, red edges. The only book of its kind published. It not only tells you how to locate troubles and make repairs, but shows you.

CONTENTS

Back or too early firing (preignition)—Blow-back of gas into carburetor—Popping noises—Buzz in coil (other than contact breaker buzz)—Misfires—Smells—Stoppage of engine—Batteries—Bearings—Brakes—Carburation—Change speed gear—Clutch—Coil—Connecting rod or crank shaft broken—Gear—Governor—Ignition—Lubrication—Misfires—Muffler troubles—Overheating—Piston troubles—Popping in carburetor—Spark plug—Steering—Timing—Tires—Valves—Valve springs, and numerous other troubles.

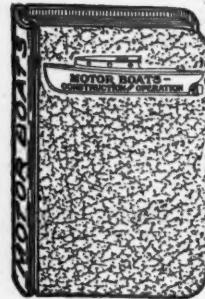


Motor Boats: Construction and Operation

By THOMAS H. RUSSELL, A.M., M.E.
Pocket size, 300 pages, fully illustrated, flexible leather, round corners, red edges. A manual for motor boat and yacht owners and all users of marine gasoline engines.

CONTENTS

Principles of marine gasoline engines—The two cycle and four cycle engine—The power boat in business, recreation and racing—Battery and magneto ignition—Use of wet batteries and dry cells—High tension and low tension current—The storage battery and dynamo—Actual working of marine gasoline engines—Carburation and carburetors—Valves and connections—Latest improved types—Motor troubles, their causes—Lubrication and lubricators for marine engines—Offset cylinder construction—Reverse gears—Two and three bladed wheels—Motor boat hull construction, etc., etc.

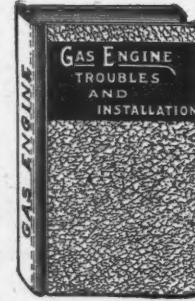


Gas Engine Troubles and Installation

By J. B. RATHBUN, B.S.C.E.
Author of "Commercial Vehicles for All Purposes," "Oxygen—Acetylene Welding," etc.

440 Pages, 150 Detailed Line Drawings and Illustrations.

A book that shows you HOW TO INSTALL—HOW TO OPERATE—HOW TO MAKE IMMEDIATE REPAIRS and HOW TO KEEP A GASOLINE ENGINE RUNNING. The language is simple—The illustrations are clear. The book is authentic—complete—up-to-the-minute, written by an expert who is employed daily as a Consulting and Demonstrating Engineer and Instructor. Nothing has been omitted—it contains no useless matter—Just the cream of daily experience. Two Folding Trouble Charts.



BOOK
DEPARTMENT

CLASS JOURNAL COMPANY

910 S. MICHIGAN AVE.,
CHICAGO, ILL.

Ignition, Timing and Valve Setting

By THOMAS H. RUSSELL, A.M., M.E.

Pocket size, 225 pages, fully illustrated, Red Flexible Leather Binding, round corners, red edges. A comprehensive illustrated Manual of self-instruction for Automobile Owners, Operators and Repairmen.

CONTENTS

Electrical Ignition for Motor Car Engines—The battery and coil system—The Magneto System—Low tension and high tension methods—Magneto Ignition—General Summary of Ignition—Ignition Faults and Hints—Induction Coils, Timing Ignition—Valves and their Functions—Valve Setting—Useful Hints, etc.



Automobile Motors and Mechanism

By Thomas H. Russell, A.M., M.E.
Pocket size, 265 pages, red flexible leather, round corners, red edges, fully illustrated.

CONTENTS

The Internal Combustion Engine—Production of the fuel mixture—Function of the carburetor—The cycle of operations—Cylinders, piston and rings—Shaft and bearings—Ignition apparatus—Single and multi-cylinder engines—The two-cylinder engine—Silencing the exhaust—Detailed description of construction—Governor and governors—The centrifugal governors—Carburetors—The float-feed principle—Various types of modern construction—Flooding the carburetor—Carburetor troubles and adjustments, etc.—Transmission Mechanism—Home-made automobile for \$25—Three-wheeled motor car, etc., etc.

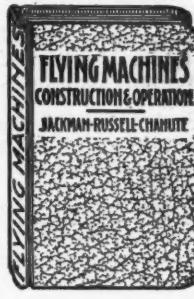
Flying Machines CONSTRUCTION AND OPERATION

By W. J. JACKMAN, M. E., and
THOS. H. RUSSELL, A.M., M.E.
With Introductory Chapter By
OCTAVE CHANUTE, C.E.
President Aero Club of Illinois.

Pocket Size, 250 pages, Fully Illustrated, Leather and Cloth, Round Corners, Red Edges. A "Show How" Book for Those Who Wish to Build and Operate Flying Machines.

CONTENTS

Evolution of Two-Surface Machine; Chanute—Difference Between Airships and Flying Machines—Mechanical Birds—Machine Limitations—How Bird Action is Obtained—Kind and Quantity of Material Required—Motors, Installation and Operation—Principles of a Successful Flying Machine—Lifting Power Required—Construction Details of Monoplanes, Triplanes and Multiplanes, etc., etc.



Automobile Driving Self-Taught

By THOMAS H. RUSSELL, A.M., M.E.

An exhaustive treatise on the Management, Care and Operation of Motor Cars. Pocket size, 230 pages, liberally illustrated, handsomely bound in red flexible leather, round corners, red edges.

CONTENTS



Automobile Driving—Self-tuition in driving—Difficulty in starting—Involuntary stops—Loss of Power—Care and maintenance of motor cars—Care of car on a tour—Laying up a car—Gasoline—Gasoline hints and tips—Operating mechanism of a modern car—Law of the Road—Don'ts for motor car drivers, and many other points.



The Grade Indicator

(At Top of Speedometer Dial)

The Grade Indicator is an accurate instrument operated automatically by gravity. Made strong and dependable, it is as unfailing as the power which operates it. It tells the exact truth about grades. It shows the various degrees of grades from zero up to thirty—the big, easily read numbers being carried on a revolving cylinder which presents the proper figure at the opening of the speedometer dial.

Note its big, honest figures—its sturdy frame—and strong brass cylinders—that means real "instrument" construction. Note that it is an expensively made automobile odometer—not a cheap bicycle odometer. Every turn of the front wheel is registered because its brass cylinders are revolved by a direct drive mechanism. It cannot lie because it contains no springs to break or weaken—no pawls to slip or fail. Hard bronze gears—solid brass cylinders—direct drive mechanism—positive action—service everlasting.

Don't forget the strong, unbreakable, "trouble-proof" driving equipment of the Stewart Speedometer—a flexible shaft that will outlast the car to which it is attached—a drop forged swivel joint to provide for the movement of the front wheel in turning corners (others use a cast joint)—noiseless front wheel gears.

You can get the New 1913 Stewart Speedometer with Grade Indicator on any make of car if you insist.

SEND FOR CATALOG
Stewart & Clark Manufacturing Company

1931 Diversey Boulevard, Chicago

BRANCHES—Detroit Chicago San Francisco New York Boston Cleveland
Philadelphia Kansas City Los Angeles Minneapolis Indianapolis London Paris

Model B Speedometer with Grade Indicator . . . \$50
Model B-1 Speedometer with Grade Indicator and Clock . . . \$85

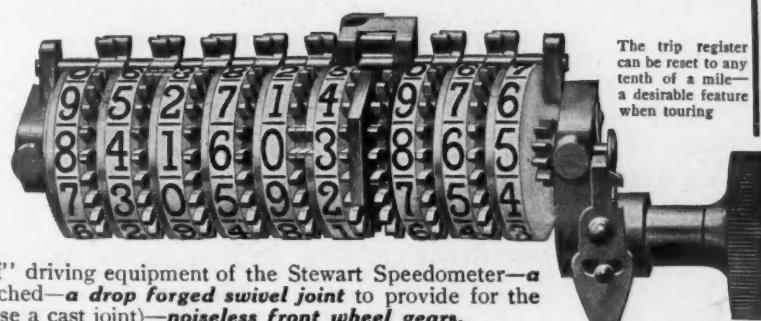
Out of 158 Car Makers who have selected the magnetic type of speedometer for equipment on their cars, 134 have selected the Stewart Speedometer.

The Selection of the Stewart Speedometer by this great majority of car makers signifies only one thing—that the **Stewart Speedometer is an instrument of superior merit**. Think what this means! The Stewart Speedometer is the almost unanimous selection of car makers—men who are especially competent to judge of the merit of a speedometer— inventors, designers and manufacturers of fine mechanism themselves. Even if you didn't know that the Stewart Speedometer is a magnificent instrument—strong, lasting, accurate, beautiful—you could safely rely upon the judgment of 134 car makers out of 158.

Therefore, if you desire permanent satisfaction insist on getting the New 1913 Stewart Speedometer with Grade Indicator when buying a car. The chances are that the car of your choice will bear the Stewart Speedometer as standard equipment because over eighty per cent of the total output—ALL MAKES—for 1913 will bear the Stewart Speedometer as standard or special equipment. Even if the car you select is not so equipped you can get the Stewart Speedometer if you insist. The maker or dealer will gladly and quickly put one on—all you will have to do is to say: "I want the New 1913 Stewart Speedometer with Grade Indicator on my car."

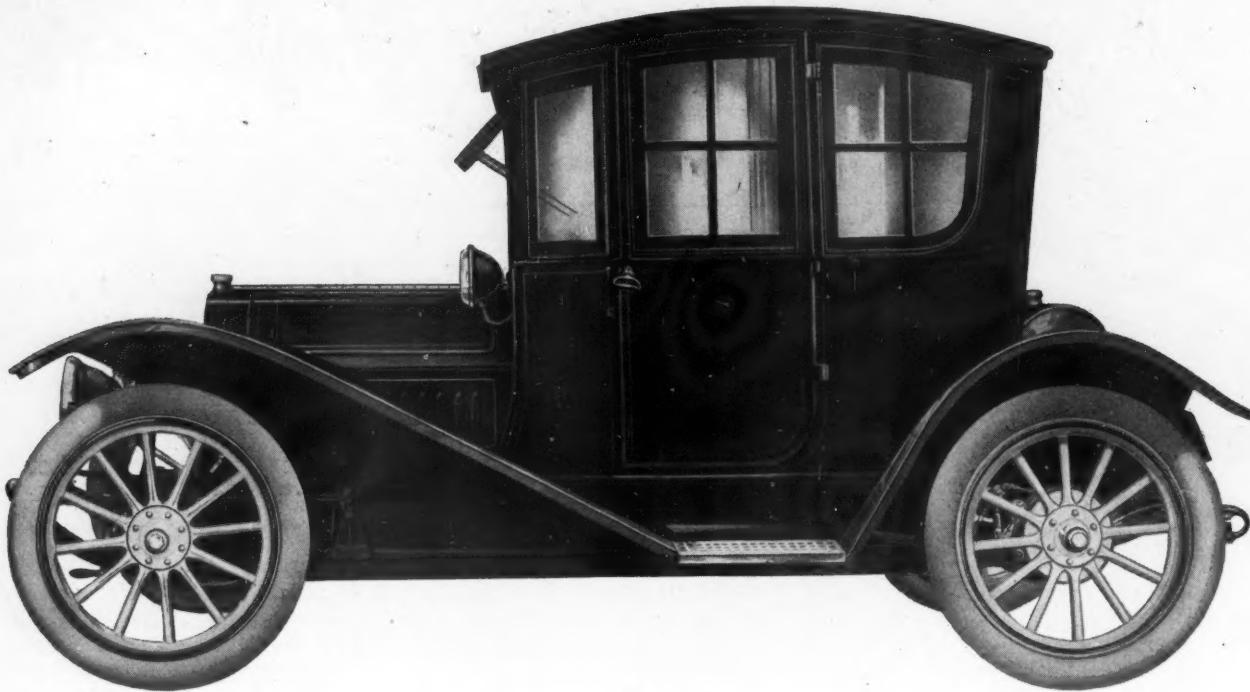
And you can rest assured that you will be right because you will have the trained judgment of one hundred and thirty-four car makers to back you in your choice.

A Real Automobile Odometer. This Big, Sturdy Distance Recorder is Combined with the Stewart Speedometer



The Grade Indicator cannot be obtained with any other make of speedometer. It is combined only with the Stewart

THE Regal "Colonial" Underslung Coupe is without question most beautiful in design, most serviceable in its convenience and utility, and undoubtedly one of the most luxuriously comfortable cars ever offered for sale. It's 1912 popularity as a perfectly appointed closed car, with its 1913 added refinements and equipment, will create for this widely copied model a great demand.



\$1,250

The Regal "Colonial" Underslung Coupe

The Specifications Read Carefully

Wheel Base, 100 inches; Tires, Morgan & Wright, 32 x 3½ inches; Selective Sliding Gear Transmission, three speeds forward and reverse; motor, Four Cylinders, cast en bloc; Bore, 3¾ inches; Stroke, 4½ inches; Dual Ignition; Thermo Syphon Cooling. Equipment includes Electric Lights, with option of gas headlights, and Prest-O-Lite Tank; Electric Horn; Tool and Tire Repair Kit. Price, \$1250

Price Consideration

¶ We assert that here is a combination of high quality and most reasonable price that will appeal to the "well informed" as an offering of unusual merit and by every comparison, individually distinct. This beautiful car has made a record in sales and service of which we are justly proud.

Wire or Write

**The Regal Motor Car Co. Automobile
Manufacturers Detroit, Mich.**

When Writing to Advertisers, Please Mention Motor Age.

Don't be Satisfied with Half-Way Knowledge of Your Motor-Car

First, get at the fundamentals—the big, construction features that mean strength, safety, speed, power.

Here's one of the big things you ought to know about:

The Power-Transmitting Unit of a Timken-Detroit Rear Axle.

It's shown at the right just as you see it when the body of the car is removed and you look down on the chassis—lower on the page you see it in detail.

Study it—read the description carefully.

It's one of the great Timken contributions to good axle construction.

And it includes the most important single contribution to American motor-car manufacture:—Timken Tapered Roller Bearings.

TIMKEN BEARINGS & AXLES

In a Timken Rear Axle all the gears—pinion, driving and differential gears—form a unit.

This unit is completely assembled and tested before it is put into the axle.

It is bolted to the front of the housing and is easily removable.

The large removable rear cap of the housing permits convenient inspection and adjustment from the rear.

The quiet running and high efficiency of Timken gears is partly due to this unit construction—proper relation of all parts is assured *before* the axle is assembled.

It is partly due to the grinding of the gears by a special Timken-built machine—the *one gear-grinding machine* made that corrects all the microscopic inaccuracies left by even the finest gear cutters.

It is lastly and largely due to the Perfect Service given by Timken Tapered Roller Bearings.

The Power-Transmitting Unit is carried by these bearings.

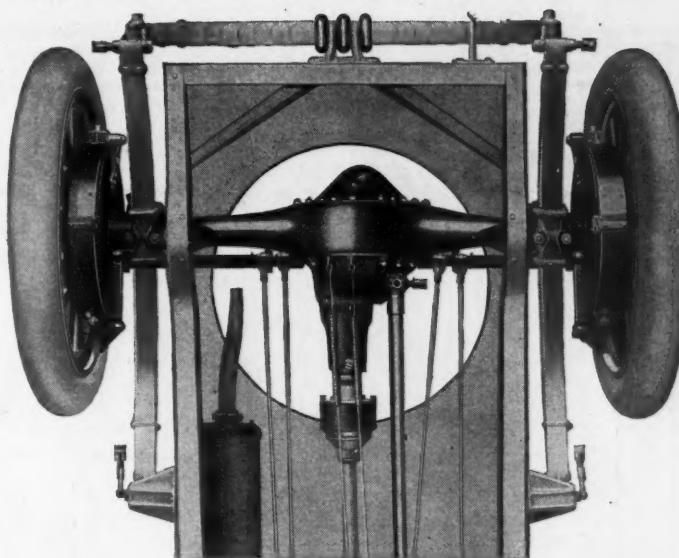
They keep shafts in line and gears accurately in mesh, *saving power* and insuring quiet running.

They do this because of three great principles of Timken Tapered Roller Bearing construction.

1. A greater load capacity than balls because they carry the load along their whole length instead of on points only.

2. Greater ability to meet force from the end as well as the side—because the rollers are tapered.

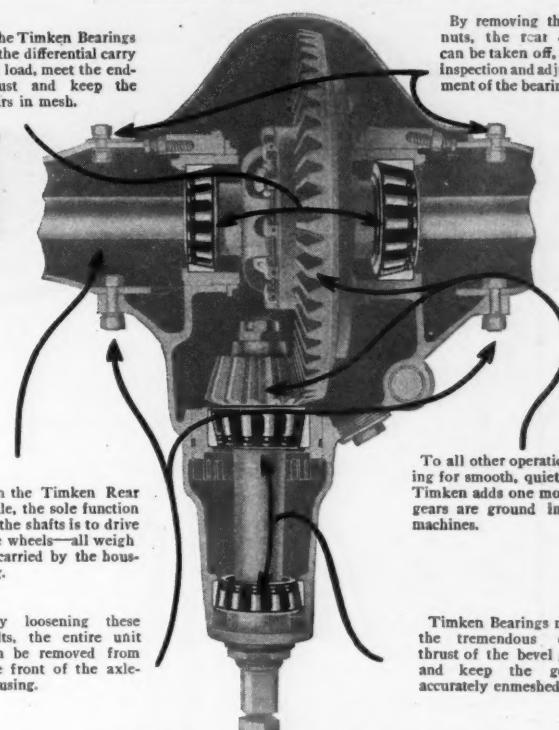
3. Perfect adjustability for wear—due to the tapered construction.



Above is a picture of a Timken-Detroit Rear Axle, showing the position of the Power-Transmitting Unit illustrated in detail below.

The Timken Bearings on the differential carry the load, meet the end-thrust and keep the gears in mesh.

By removing these nuts, the rear cap can be taken off, for inspection and adjustment of the bearings.



In the Timken Rear Axle, the sole function of the shafts is to drive the wheels—all weight is carried by the housing.

To all other operations making for smooth, quiet running Timken adds one more—the gears are ground in special machines.

By loosening these bolts, the entire unit can be removed from the front of the axle-housing.

Timken Bearings meet the tremendous end-thrust of the bevel gear and keep the gears accurately enmeshed.

Good Axle Construction Demands Human Integrity and Efficiency

It isn't merely one, or even all of its notable features that makes the Timken-Detroit Rear Axle.

It's really the human equation back of the whole.

An organization that began before the motor-car industry was dreamed of.

That for years has been devoted exclusively to building motor-car axles—and to nothing else.

Whose product represents the whole sum—not a part—of motor-car axle knowledge and experience: American and European.

The Timken story requires many chapters—this advertisement is only one.

Look for the others and read them—they will give you a new understanding of the modern motor-car.

You can get the whole story of axle and bearing importance and construction by writing to either address below for the Timken Primers, T-9 "On the Care and Character of Bearings," and T-10 "On the Anatomy of Automobile Axles."



THE TIMKEN-DETROIT AXLE CO., DETROIT, MICH.
THE TIMKEN ROLLER BEARING CO., CANTON, OHIO

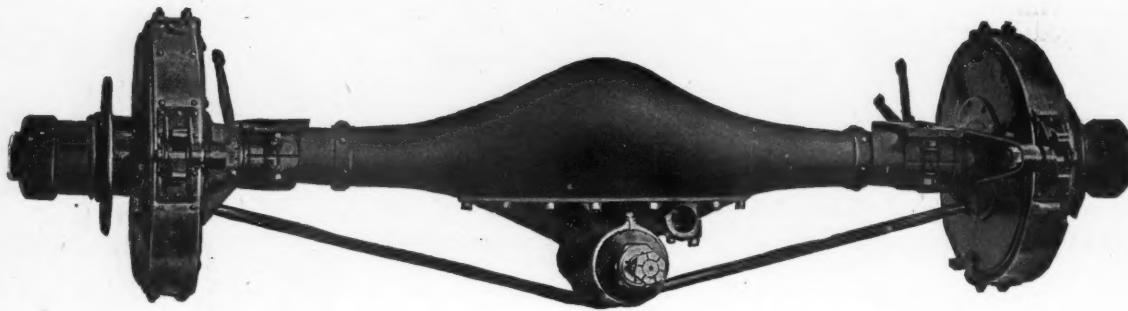


American *American*

American Axles

Won't Rob Your Electric's

Battery



The less current demanded to turn over your axles, the more power you have for mileage.

No electric car buyer can ignore that great truth, simply stated.

American Axles have proved that they conserve and transmit the maximum of power that any battery can give.

Ample evidence for you lies in the fact that *American Axles* are actually in use on 80 per cent of the electrics in this country.

The option of Bevel Drive or Lanchester-Daimler Worm Gear can be had with American Axles only.

THE AMERICAN BALL BEARING COMPANY

Edgewater Park and L. S. & M. S. Ry.

Cleveland, Ohio

American

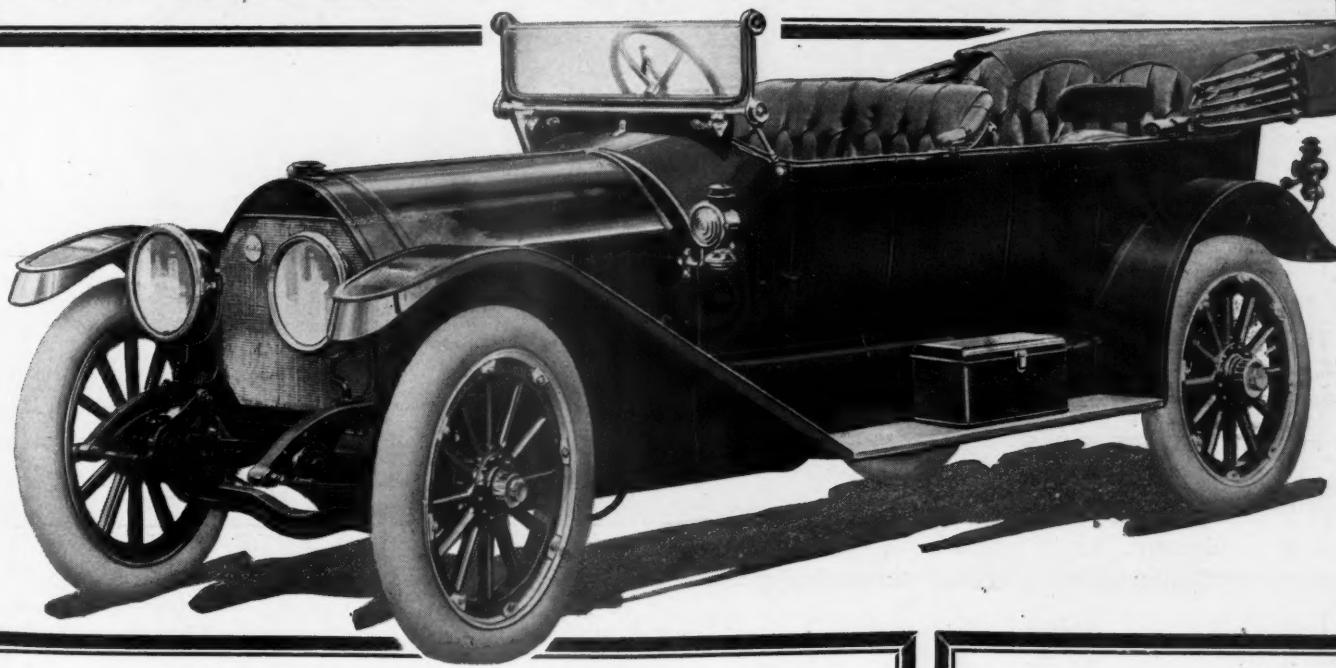
**See it at
the shows**

New York

PLEASURE CARS
No. 22 Grand Central Palace.
TRUCKS
No. 113a Madison Square Garden.

Chicago

PLEASURE CARS
No. M1 Coliseum Annex.
TRUCKS
Section C, Coliseum.



KISSELKAR

THE KisselKar is the automobile of distinction and extraordinary comfort because it has exceptionally long wheelbase, roomy tonneaus, roomy driver's compartment, eleven inches of resilient upholstery, perfect spring action, unusually deep seats, wide range of throttle control, and great ability to drive slow or fast, or climb hills on fourth geared-up speed. Ride in a KisselKar, and you will find yourself less affected by road vibration and side-sway than in any other automobile.

Unmatched KisselKar Service

KisselKar Service actually doubles the value of every dollar invested in a KisselKar. A car kept constantly in perfect condition not only gives uninterrupted service free from annoyances, but depreciation is so retarded that the car keeps its snappiness years longer than otherwise. KisselKar Service is supplied by a national service organization maintained by the manufacturers, with specially equipped buildings at principal points manned by factory-trained men who, in cooperation with agencies keep your car under constant observation, and in perfect condition.

Kissel Motor Car Co., 121 Kissel Ave., Hartford, Wis.

BOSTON NEW YORK CHICAGO MILWAUKEE KANSAS CITY
LOS ANGELES MINNEAPOLIS ST. PAUL DALLAS
Philadelphia, Cleveland, Detroit, El Paso, San Antonio, New Orleans, Baltimore, Omaha, Butte, Denver, San Francisco, Seattle, Portland, Duluth, Buffalo, Pittsburgh, Hartford, Conn., New Haven, Albany, Troy, Montreal, Quebec, Toronto, Winnipeg, and 200 other principal points throughout America.

**"Thirty" \$1700
"Forty" \$2000
"Fifty" \$2500
60 H.P. "Six" \$3150**

**Electric Started and Lighted
fully equipped and appointed**

KisselKar 1913 Catalog

Write for 1913 catalog. This book elaborately pictures and describes all KisselKar pleasure models. It will give you a new standard by which to judge automobile values.

KisselKar Trucks

1500 lb., 1, 2, 3, 4 and 5 ton trucks—all type bodies; Delivery cars, Fire Dept. Apparatus, Omnibuses, Ambulances, Police Patrols, and all other types of utility cars.

Write for special truck catalog.

The Atwater Kent Ignition System

is not only distinctive from other ignition equipment in name, but it is advantageously different from all others in many respects.

Other ignition equipment have the distinction without the difference.

The Atwater Kent System is different in embodying the best features of both magneto and battery. In fact, it gives magneto results with a battery system, without the weaknesses of either, at less than one-half the cost of a good magneto.

It is ideal for use in connection with lighting and starting equipment, as it produces a hot dynamic spark, perfectly timed, regardless of the engine speed.

Just a few of the many good features of the Atwater Kent System are—

Its simplicity of mechanism—no vibrators, relays or commutator—just one contact point regardless of the number of cylinders and only three moving parts, none of which is subject to excessive wear.

Its single adjustment easily and quickly made and seldom requiring attention.

Its adaptability and easy installation on any standard make of motor, new or old.

There are now two types of Atwater Kent Ignition equipment—standard Type F and the new Type K—



the latter having the automatic spark control and insulated primary circuit features.

Prices of the Type F System

	Standard Coil.	Kick Switch Coil.
1-cylinder	\$17.00
2-cylinder opposed	18.00
2-cylinder distributor type	22.00	\$24.00
3-cylinder distributor type	25.00	27.00
4-cylinder distributor type	25.00	27.00
6-cylinder distributor type	27.00	29.00

Prices of the Type K System

	Standard Coil.	Kick Switch Coil.
2-cylinder	\$32.00	\$35.00
3-cylinder	35.00	38.00
4-cylinder	35.00	38.00
6-cylinder	37.00	40.00

In substituting the Atwater Kent System for the magneto, or for driving it from any horizontal shaft or gear, we furnish a special magneto gear mounting, the additional price of which is \$5.00.

Perhaps your present car needs only an Atwater-Kent—"the different" system of ignition to enable it to give you perfect service. Anyhow you should have a copy of our booklet A, it's interesting and it's free.

ATWATER KENT MFG. WORKS

4934 Stenton Ave.

Philadelphia, Pa.



This book will show you why the Franklin dealership is a profitable one. Send in your application at once

The dealer who handles the Franklin has a car with six exclusive features, each one of which is a sales clinching fact.

ENTZ ELECTRIC STARTING AND LIGHTING

A real self-starter with really original features. Unfailing in action. You throw on the switch and the motor starts—no buttons, levers or pedals. In crowded traffic, if you slow the engine down to where it would ordinarily stall, the starter picks it up and starts it running again without any action on the part of the driver. A permanently connected starter without change gears.

THESE ARGUMENTS SELL FRANKLIN CARS

These are the arguments you can bring to bear upon the prospect when you show him the Franklin: (1) Uses less gasoline; (2) Uses less oil; (3) Wears out fewer tires; (4) Travels faster in the long run; (5) Rides easier; (6) Lasts longer.

Franklin dealers are making money and Franklin sales are increasing steadily every year. The Franklin now stands third in sales among all high-grade cars, and rapidly gaining on second place. The "Franklin Dealer Proposition" shows why this is so.

A PERMANENT BUSINESS CONSTANTLY INCREASING

One of our dealers says: "I could not very well drop the Franklin if I wanted to. Everywhere I have sold them I have created a permanent business. Franklin owners come back year after year."

The Franklin dealer does an all-year-around business. This means a profitable garage business. Franklin cars keep going summer and winter. They keep going because Franklin direct air cooling is not affected by weather conditions. They keep going because the owners can afford to drive them. They do not cost heavily to operate. If you sell Franklin cars in your territory you have a steady year-around demand for gasoline, oil, tires and accessories.

CONTINUOUS PRODUCTION INCREASES BUSINESS

Our continuous production policy makes the Franklin dealership a good proposition for the dealer. You can always offer the very latest model with the newest equipment. There are no "off months" waiting for the so-called yearly announcements. Franklin dealers do a good business every month in the year.

SEND FOR FRANKLIN DEALER PROPOSITION

Chicago has increased sales over last year, 195%; Philadelphia has increased sales 357%; San Francisco has increased sales over last year 200%; New York has increased sales 72%; Boston has increased sales 104%; Cincinnati has increased sales 500%. There is a big increase all along the line. The Franklin Dealer Proposition will explain how you can get your share of this big increase.

Franklin Automobile Company, 27 Franklin Square, Syracuse, N. Y.

When Writing to Advertisers, Please Mention Motor Age.

DEALER APPLICATION

FRANKLIN AUTOMOBILE COMPANY
27 Franklin Square Syracuse, New York

Please send "Dealer Proposition" as advertised in December 26 Motor Age.

Name

Address

Available Capital

Shop Facilities

Three references

.....

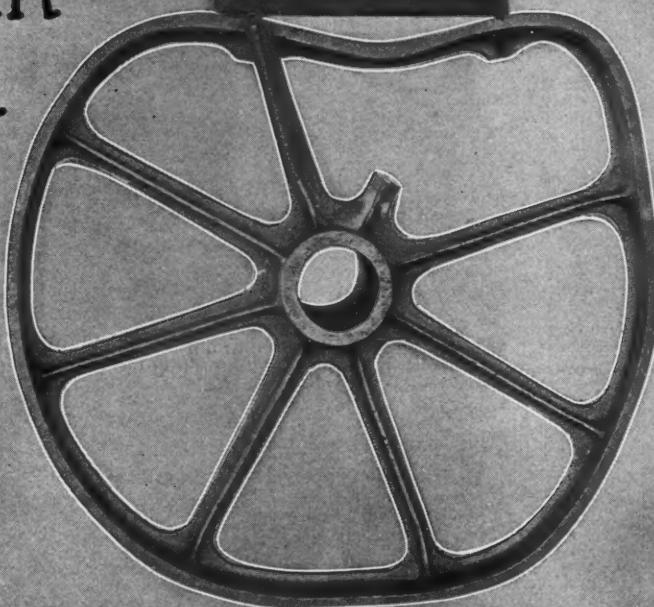
Cars handled now

Yes they can
be broken

BUT NO BLOW IN
ACTUAL SERVICE
CAN DO IT

SHELDON
STEEL WHEELS

50 TONS

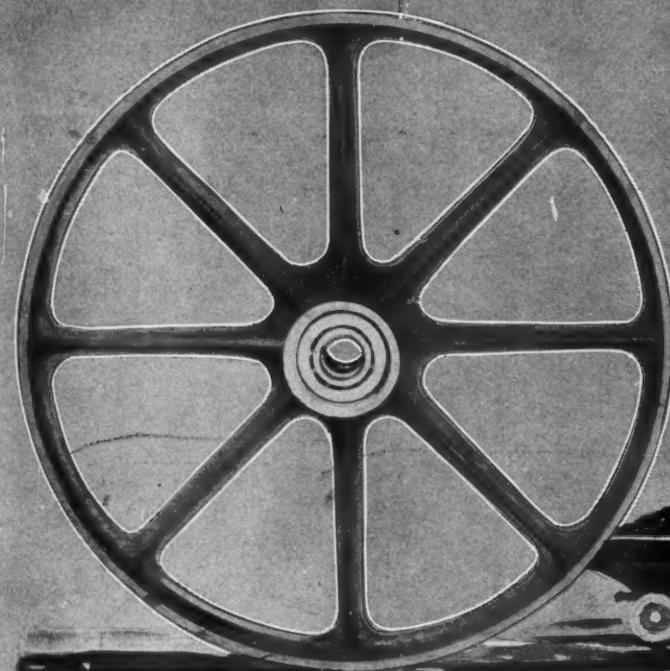


Here is a wheel that weighs less than the wooden wheel, that is positively unbreakable and that will outlast the best twenty cars that ever were manufactured.

The Sheldon steel wheel is the result of years of study of the wheel problem, the concentration of expert effort on improved design, and the most economic methods of construction known to the industry. It is unbreakable under conditions that would smash a wooden wheel to fragments and make a wire wheel unfit for anything but junk. The superior resiliency of the Sheldon steel wheel adds another advantage which the car owner or car manufacturer cannot overlook—tire economy.

This tire economy results from the light weight at the wheel's periphery and the rapidity with which frictional heat radiates from the metal. These are scientific facts which cannot be contradicted and should not be overlooked by any car manufacturer.

The stamp of superiority which has always rested on Sheldon Axles has been put upon the Sheldon steel wheel, which means that no wheel could be better made in any factory.



SHELDON AXLE CO.
WILKES-BARRE PA.

CHICAGO BRANCH
DETROIT BRANCH

68 E 12th ST.
1215 WOODWARD AVE.

THE
WHEEL
OF THE
FUTURE



\$985

*Completely
Equipped**Overland*

\$985

*Completely
Equipped*

High-priced feature No. 9

Every Overland motor is thoroughly "worn-in" on the block under a belt for 48 hours; it is then tested on the block under its own power for 48 hours.

Not content with these tests, we require that each chassis be tried out on country roads—carrying a test body weighed with 800 pounds of sand bags.

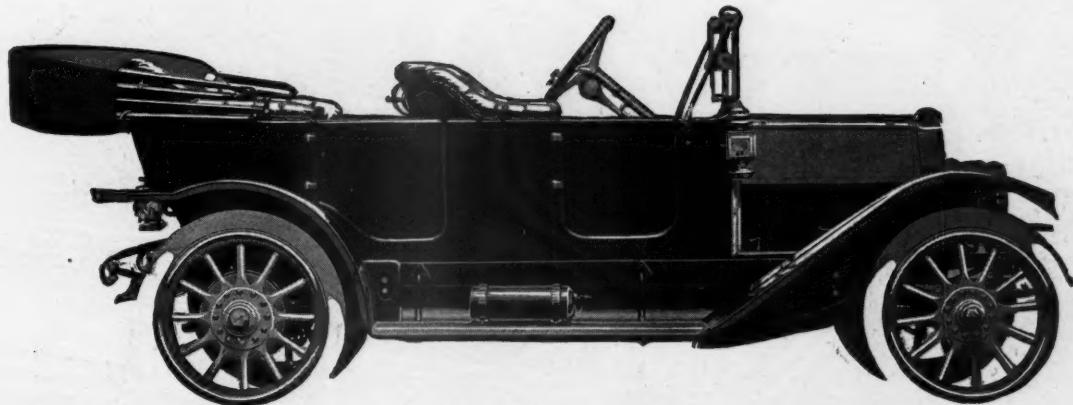
Finally, each completed car is subjected to a trying 5-mile drive by an expert driver.

When you buy an Overland you are buying guaranteed performance.

In the Model 69T this high priced inspection and supervision costs but \$985.

Write today for details. Please address Dept. 46.

The Willys-Overland Company
Toledo, Ohio



In Two Buildings
For Two Weeks

Grand
Central
Palace

Lexington
Avenue
46th-47th St

Madison Square Garden
Madison Ave, 26th-27th St

NATIONAL

AUTOMOBILE SHOW

January 11 to 18

Pleasure Cars

(Gasoline and Electric)

Motorcycles

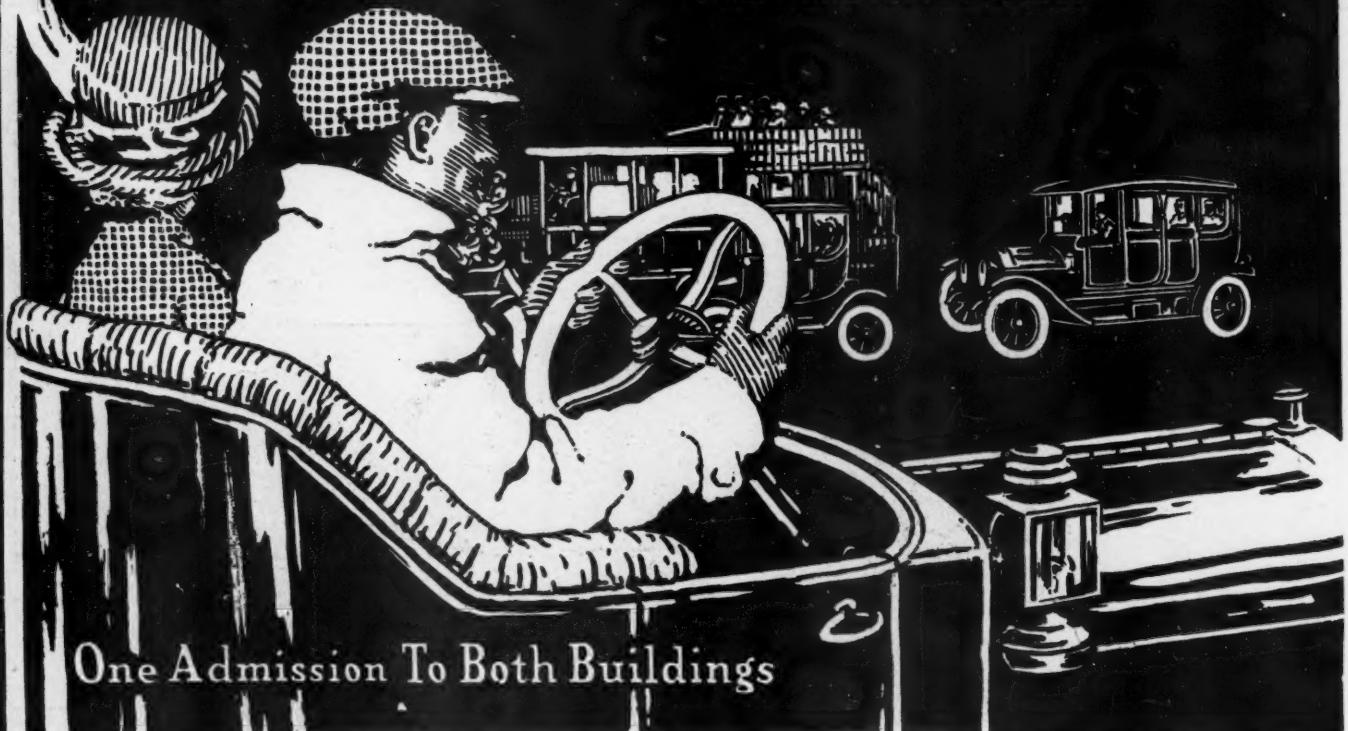
Parts and Accessories

January 20 to 25

Commercial Cars

(Gasoline and Electric)

Parts and Accessories



One Admission To Both Buildings

Merry Christmas

Charles Dickens
Robert Louis Stevenson

Clement C. Moore
James Whitcomb Riley
F. Hopkinson Smith

Henry Van Dyke
Eugene Field

"My friends, my veyh dear friends, I should say, for I omit none of you—befo' I kindle with the torch of my love these little beacons which are to light each one of us on our way until another Christmas season overtakes us; befo', I say, these sparks burst into life, I want you to fill yo' glasses—"Col. Carter's Christmas Tree.—F. Hopkinson Smith.

"I don't know what to do!" cried Scrooge, laughing and crying in the same breath and making a perfect Laocoon of himself with his stockings. "I am as light as a feather. I am as happy as an angel. I am as merry as a schoolboy. I am as giddy as a drunken man. A merry Christmas to everybody! A happy New Year to all the world. Hallo, here! Whoop! Hallo!"

"He had frisked into the sitting room and was now standing there, perfectly winded.

"I don't know what day of the month it is!" said Scrooge. "I don't know how long I've been among the spirits. I don't know anything. I'm quite a baby. Never mind. I don't care. I'd rather be a baby. Hallo! Whoop! Hallo here!"

"He was checked in his transports by the churches ringing out the lustiest peals he had ever heard. Clash, clang, hammer, ding, dong, bell. 'Oh, glorious, glorious! Running to the window he opened it and put out his head. No fog, no mist; clear, bright, jovial, stirring, cold; cold, piping for the blood to dance to; golden sunlight; heavenly sky; sweet, fresh air; merry bells. Oh, glorious! Glorious!"

"What's to-day?" cried Scrooge, calling downward to a boy in Sunday clothes.

"To-day!" replied the boy. "Why, Christmas Day."

"It's Christmas Day!" said Scrooge to himself. "I haven't missed it. The spirits have done it all in one night. They can do anything they like. Of course they can!"—Dickens.

"To be honest, to be kind; to earn a little and spend a little less, to make upon the whole a family happier for his presence to renounce when that shall be necessary and not be embittered, to keep a few friends, but these without capitulation; above all, on the same grim condition, to keep friends with himself—here is a task for all that a man has of fortitude and delicacy. He has an ambitious soul who would ask more; he has a hopeful spirit who should look in such an enterprise to be successful."—Robert Louis Stevenson. *A Christmas Sermon.*

Probably more grown men and women can repeat to-day: "Twas the Night Before Christmas" than can remember any other poem of equal length in the language. They may have forgotten the name of the author, Clement C. Moore, but they can reel off the beginning glibly enough:

"Twas the night before Christmas and all through the house Not a creature was stirring, not even a mouse; The stockings were hung by the chimney with care In hopes that St. Nicholas soon would be there; The children were nestled all snug in their beds, While visions of sugar plums danced in their heads.

And how these elocutionary lights, as well as the rest of us who are not vocally inclined, have revelled in Eugene Field's delicious "Jes' 'Fore Christmas." "Father calls me William, sister calls me Will, Mother calls me Willi—the fellers call me Bill!"

• * * * *
Most all the time the hull year round there ain't no flies on me, But jes' 'fore Christmas I'm as good as I kin be!
And the pious snugness with which this interesting imp concludes is unctuous joy to the soul of the reader:
But Christmas, with its lots and lots uv candies, cakes and toys, Wus made, they say, fur proper kids and not fur naughty boys!
So wash yer face an' bresh yer hair an' mind your p's and q's,
An' don't bust out yer pantaloons an' don't wear yer shoes.
Say "yessum" to the ladies an' "yessir" to the men,
An' when they's company don't pass yer plate fur pie again;
But, thinkin' uv the things you'd like to see upon that tree,
Jes' 'fore Christmas be as good as you kin be!"

"They's a kind o' feel in the air to me When the Chris'mas time sets in That's about as much of a mystery As ever I've run ag'in."

Is it the bleat o' the whistle and beat O' the little toy drums' and blare A' the horn? No! No! It is jest the sweet—
The sad-sweet feel in the air!"

James Whitcomb Riley.

"Hang up the baby's stocking;
Be sure you don't forget;
The dear little dimpled darling,
She ne'er saw Christmas yet."

Henry Van Dyke! preaches another pretty good sermon in "The Spirit of Christmas," which was published seven years ago. He says there is something better than keeping Christmas Day, "and that is keeping Christmas. Are you willing to forget what you have done for other people and to remember what other people have done for you; to ignore what the world owes you, and to think what you owe the world, to put your rights in the background, your duties in the middle distance and your chance to do a little more than your duty in the foreground; to see that your fellowmen are just as real as you are, and try to look behind their faces to their hearts, hungry for joy; to own that probably the only good reason for your existence is not what you are going to get out of life, but what you are going to give, to life to close your book of complaints against the management of the universe, and look around you for a place where you can sow a few seeds of happiness—are you willing to do these things, even for a day? Then you can keep Christmas.

"Are you willing to stoop down and consider the needs and desires of little children; to remember the weakness and loneliness of people who are growing old; to stop asking who much your friends love you, and ask yourself whether you love them enough; to bear in mind the things that other people have to bear in their hearts; to try to understand what those who live in the same house with you really want, without waiting for them to tell you; to trim your lamp so that it will give more light and less smoke, and to carry it in front so that your shadow will fall behind you; to make a grave for your ugly thoughts and a garden for your kindly feelings, with the gate open—are you willing to do these things even for a day? Then you can keep Christmas.

"Are you willing to believe that love is the strongest thing in the world—stronger than hate, stronger than evil, stronger than death—and that the blessed life which began in Bethlehem nineteen hundred years ago is the image and brightness of the Eternal love? Then you can keep Christmas. And if you can keep it for a day, why not always?"

"And so, as Tiny Tim observed, God Bless Us, Every One!"

Says Longfellow:
"I heard the bells on Christmas Day
Their old familiar carols play.
And wild and sweet
The words repeat
Of peace on earth, good will to men!"

S BRETZ COMPANY
SOLE IMPORTERS
F & S
Ball Bearings
250 West Fifty-fourth, New York

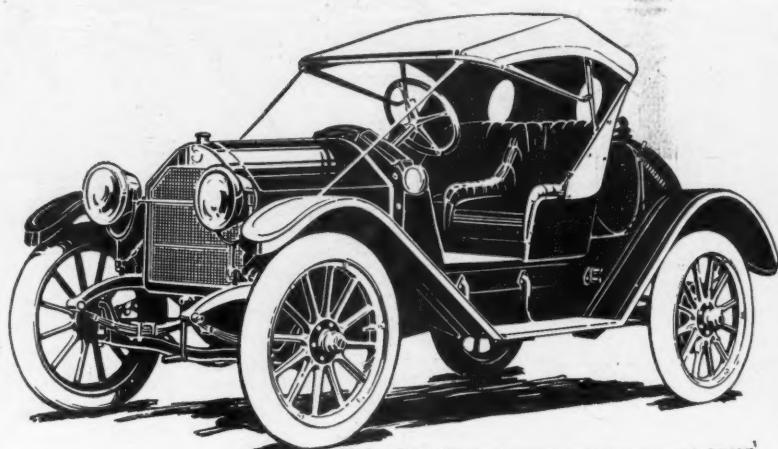
Marion
The
Snappiest Roadster
of the Year

This is the famous Marion "Bobcat" roadster, a two passenger touring-speed car with racy lines, deep, comfortable seats, an attractive color and complete equipment. It offers unusual value for its price, \$1425.

The "Bobcat" has led many fast cars on track and road. It is a mile-a-minute car, which is just as suitable for cross country travel as for a rapid run over boulevards. It has deep cushions, long, easy riding springs and 30-40 h. p. motor.

In its equipment are such features as, Disco self-starter, Prest-O-Lite tank, dynamo electric lighting system for all lights, Q. D. demountable rims, Warner Speedometer, storm front, silk mohair top, boot and curtains. It is finished in cardinal red and its metal trimmings are nickel plated.

Send to us for illustrated description of this car.



Marion 36-A "Bobcat" roadster, fully equipped, \$1425

Marion Cars at the Shows

The complete line of Marion cars will be exhibited at all important shows. They will be stock cars—not a special Marion has been prepared. Our regular product is an example of the highest efficiency attainable in automobile manufacturing.

Do not fail to see the two Marion touring cars and two roadster models at the New York show in the Grand Central Palace, or in Chicago at 2450 Michigan Avenue.

THE MARION MOTOR CAR COMPANY, 902 Oliver Ave., Indianapolis

**"In exchange for your empty gas tank
accept only a genuine Prest-O-Lite"**

This is the message that is going to Prest-O-Lite users everywhere.

In it there is a hint for the wise dealer, as well.

You know that no imitator of Prest-O-Lite has ever successfully imitated Prest-O-Lite Service.

You also know that no imitator ever made good the large claim, "more gas and better gas than Prest-O-Lite."

So does your customer.

Imitations are getting harder and harder to sell. There are now mighty few dealers trying it.

Most of those who yielded to the old but ever tempting claim "More Profits" have come back home.

To the dealer who is still trying to force imitations on people who won't have them, perhaps because he has money tied up in them, we can only say:

"The sooner you resume earning your good old Prest-O-Lite profit, the sooner you will make your income what it used to be."

The Prest-O-Lite Co. 233 E. South St.
Indianapolis, Ind.

Canadian Factory and General Offices, Merrittton, Ont.
Branch Offices and Service Stations in all principal cities.
Charging Plants in all parts of the country.
Extensive foreign service.

Exchange Agencies Everywhere



CHICAGO
SHOW SPACE
North Coliseum
Gallery

RUTENBER MOTOR COMPANY

For the race with the stork, whether by day or by night, when there is something to be delivered P. D. Q., in town or country, though streets be crowded and roads be rough, the doctor must have a car that he can depend on. He can take no chances with a motor of spasmodic performance. He must *get there* and get there quickly.

There is no motor that gives such uniformly reliable service for the doctor's car as

THE RUTENBER MOTOR

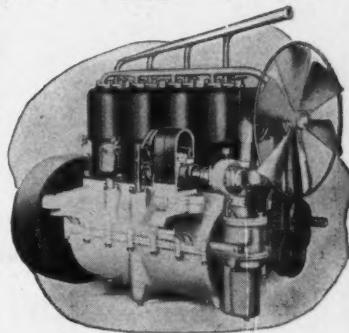
It is built for precisely this kind of use. It is always ready, always in running order, always dependable. Rough roads and bad weather have no terrors for the doctor whose car is equipped with the redoubtable Rutenber. When speed is required it will run like a deer. It does not falter or hesitate. It does not jar out of adjustment. It does not heat up under hard driving or require an expert to keep it in order.

More than a score of the best selling cars in America carry Rutenber Motors in their 1913 models.

The Rutenber Motor will give to *your* car the element of reliability that is fundamental to successful automobile construction; and will solve your motor troubles and assure to your product an unfailing market.

Write for the Rutenber Booklet.

Marion, Indiana



Model R. A. Sta. Magneto side

NEW DEPARTURE Ball Bearings

Guaranteed Materials
Guaranteed Accuracy
of Dimension
Guaranteed Uniformity
signify



Guaranteed Quality
Guaranteed Service
and Capacity
Guaranteed Durability

No ball bearing is so carefully made, closely gauged, persistently inspected and insistently standardized.

THREE TYPES

Double Row:—a combined radial and thrust bearing, taking load from any direction and successfully replacing combinations of single row and thrust.

Single Row:—made in standard sizes,—a superior, strictly radial bearing.

"Radax":—a high grade cup and cone type, taking radial load and one direction thrust.

Catalog, data sheets and consultation service of our engineering department are yours for the asking.

AMERICAN MADE
FOR
AMERICAN TRADE

THE NEW DEPARTURE MANUFACTURING CO.
BRISTOL, CONN.

Western Branch: 1016-17 Ford Building, Detroit

AMERICAN MADE
FOR
AMERICAN TRADE



Electric Head \$35
Light Outfit

Complete Outfit: Generator, Head-lamps, Switch, Wire and Bulb.

Easy to install on Any Car with Exposed Fly Wheel.

No Storage Battery Required. No complicated Cut-out nor Charging Device. Self Regulating.

CURRENT DIRECT FROM ALTERNATING CURRENT GENERATOR

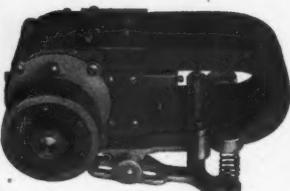
Weight only 18 lbs. Compare this with the Heavy, Complicated and Costly Charging Outfits.

More Light and Better Light

Let Us Describe It Fully

The Lighting Special Generator

The Model LS has one magnet less than our regular Model UL \$35.00 Magneto, and is just like it in every way except that the Model LS is slightly smaller. Model LS will light two $2\frac{1}{2}$ -Ampere bulbs (two sixteen candle power bulbs). It embodies the well known K-W construction, having no commutator, no brushes, and no sliding contacts, the only moving part being the rotor, which swings perfectly free, supported on high duty ball bearings.



Model LS, \$20.00

Complete Lamps, \$15.00

FOR IGNITION this Generator can be used in place of batteries if you have timer and spark coil.

Write us for prices on the K-W
Guaranteed forever Spark Coil.

We make the K-W Master Vibrator and a complete line of ignition apparatus, including the famous K-W High Tension Magneto—the strongest on earth. Don't simply ask for catalogue. Tell us your troubles and we will help you.

THE K-W IGNITION CO.
2835 CHESTER AVENUE, CLEVELAND, OHIO, U.S.A.

WE PAY THE EXPRESS East of the Mississippi River or to the Mississippi on points beyond on any of our goods, when cash accompanies the order.



When Writing to Advertisers, Please Mention Motor Age.

The Line of Beauty

Leads To HAYES Bodies



THE looks of a car have a lot to do with the sales. Looks are in the body—in the clear, clean-cut horizontal, the swelling curve of the rear seat back, the correct proportioning of shroud and hood, the graceful sweep of the fenders. The eye of the buyer notes these points before it goes deeper to motor and transmission.

Why not make the most of it?

The Hayes organization has spent its entire career in the building of handsome automobile bodies and sheet metal parts. To your needs it can bring an unexcelled experience. Its engineers know bodies as your engineers know motors. They are at your service and the results of their experience are yours when you want it.

Let our engineers go over your blue prints. They will show you the short cuts and offer suggestions worth money to you. They will make your fenders, hoods, shrouds—anything in sheet metal you want—that will prove a revelation.

You will save time, trouble and money. The Hayes organization will "speed up" your production; will stop your worry; will do the work quicker and cheaper than you can do it yourself.

Certainly this is worth investigating.

HAYES MANUFACTURING CO.

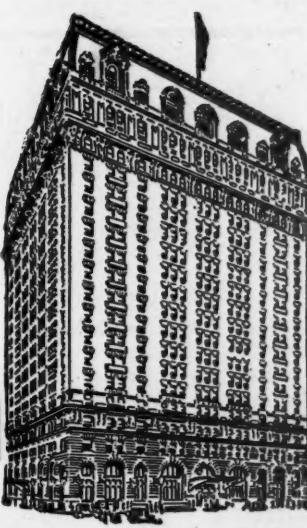
Detroit

Michigan

LARGEST USERS
OF SHEET METAL
IN THE WORLD



THIS TRADE MARK
IS ON OVER
250,000 BOXES



Hotel La Salle
CHICAGO'S FINEST HOTEL
ERNEST J. STEVENS, Vice-Pres. and Mgr.
Located in the heart of the city, within easy reach of all railway terminals

RATES

ONE PERSON	Room with detached bath.....	\$2 to \$3 per day
	Room with private bath.....	\$3 to \$5 per day
TWO PERSONS	Room with detached bath.....	\$3 to \$5 per day
	Room with private bath.....	\$5 to \$8 per day

TWO CONNECTING ROOMS WITH BATH

Two persons.....	\$8 to \$8 per day
Four persons.....	\$8 to \$15 per day
SUITES.....	\$10 to \$35 per day

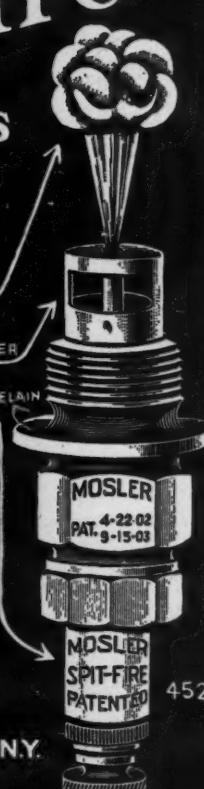
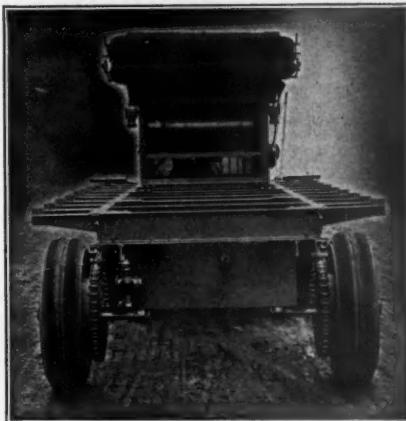
LA SALLE AT MADISON STREET, CHICAGO

Mosler Spit Fire Plugs are the BEST

SPIT-FIRE PLUGS SHOOT A FLAME
SPIT-FIRE PLUGS HAVE A DEEP CHAMBER
SPIT-FIRE PLUGS USE A PETTYCOAT PORCELAIN
SPIT-FIRE PLUGS WITH PLATINUM POINTS LAST LONGEST

USE GENUINE SPIT-FIRE PLUGS
IF YOU EXPECT THE BEST
RESULTS FROM YOUR MOTOR

A. R. MOSLER & Co.
P. O. BOX "M" MT. VERNON, N.Y.

Johnson Trucks

1-Ton

2-Ton — Chasses

4-Ton

Write for Specifications

JOHNSON SERVICE CO., Milwaukee

AUTOMOBILE PARTS

Specialization Means Superiority

OUR PRODUCTS

Pistons

Cam Shafts

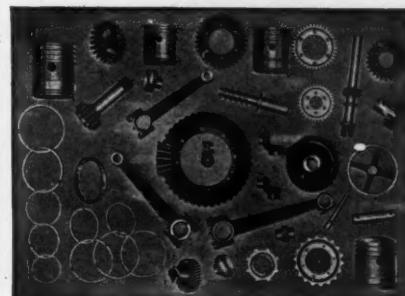
Piston Rings

Motor Gears

Piston Pins

Valves

Transmission Gears



Producing a large volume of Automobile and Motor Machine Parts, we offer you a superior product at a consistent price, and rid your factory of troublesome details. Let us also submit estimates on your

die-cast Bearing Bushing requirements. We have a special department of our business devoted to this product.

We make a special point of Helical Cut Motor Gears, the only correct solution of the motor gear problem, and Integral Cam Shafts, with cam Contours ground after hardening.

THE F. W. SPACKE MACHINE CO.
INDIANAPOLIS, INDIANA

*Profit by our experience***Improves with Age**

The quality of Chrome Vanadium Steel depends entirely upon the experience of its manufacturer.

When we first began to manufacture

**CHROME
VANADIUM
STEEL**

we were without competition.

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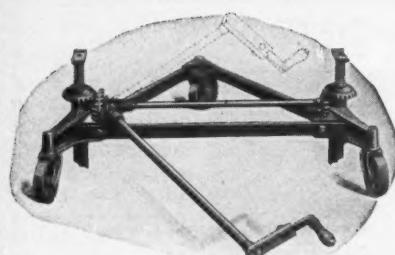
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A Lifting Jack**

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Two for \$20.00 (One for each axle of the car)

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Alden-Sampson Manufacturing Company
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Columbia Motor Car Company
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Maxwell-Briscoe Motor Company

Pursuant to decree of the United States District Court for the Southern District of New York, the properties of the above companies will be offered for sale in Room 47 of the Post Office Building, Borough of Manhattan, City of New York, on

January 8th, 1913

Sealed bids will be received by receivers at their office, Broadway & 61st Street, Manhattan, N. Y., up to 10 A. M. January 8, 1913. Bids will be announced January 8, 1913, at 11 A. M. in Room 47, P. O. Building, Manhattan, N. Y. Thereupon bidders, qualifying pursuant to terms of decree of sale, may bid further until 3 P. M. of that day if and as may be permitted by the Court. For copies of decree of sale giving terms, conditions and particulars as to bids and sale and for all further information reference may be made to the undersigned. Bidders should inspect the decree of sale.

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ROBERTS WALKER
Broadway & 61st Street, Borough of Manhattan,
New York City.

ROSENBERG & LEVIS, Solicitors for Complainant,
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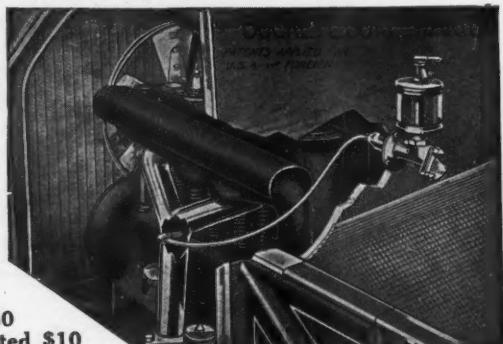
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Anyone
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Price
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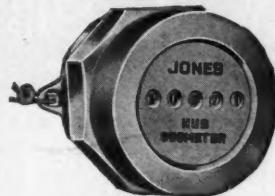
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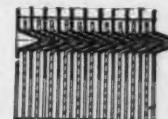
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(108)

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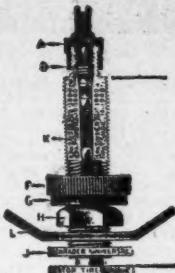
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Trade Mark Registered April 30, 1895



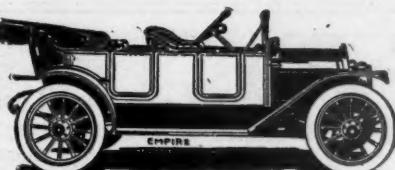
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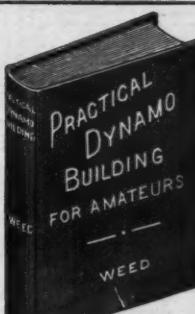
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CONTENTS

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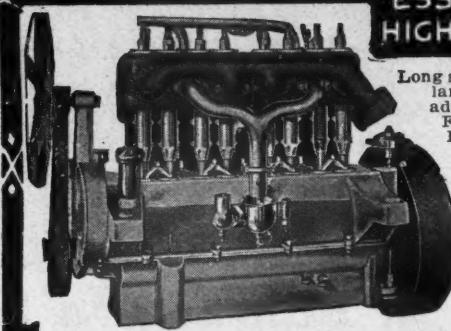
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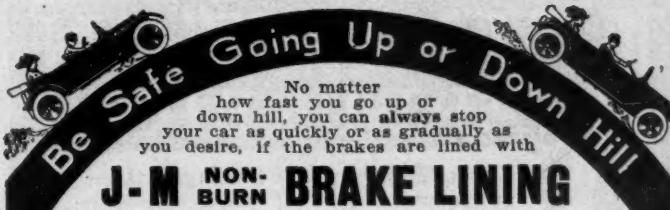
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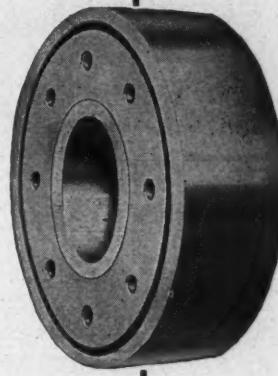
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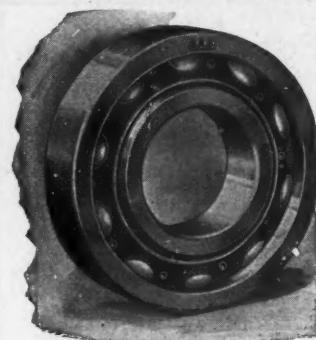
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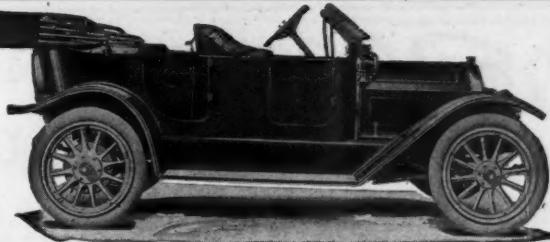
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Foreign Representative: Benjamin Whitaker, 21 State St., New York.

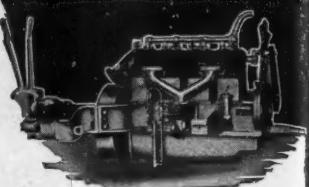
Nyberg SIX
\$1750

ANNOUNCING 1913 TOURABOUT
Complete Specifications Sent on Request
WE WANT LIVE DEALERS

NYBERG AUTOMOBILE WORKS

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Model Motors



Afford the utmost in reliability and power—with the least weight and fuel consumption. You can add much value to your car by using the Model Motor. We make them better and at less cost than you can, because we specialize in motors and power units. Write us for facts.

Model Gas Engine Works
PERU, INDIANA

THE ONE-MAN TOP

We
Exhibit
In Madison
Square Garden



Stand
No. 539
Basement
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CAN BE HANDLED BY ONE PERSON AS EASILY & QUICKLY AS AN UMBRELLA
INSTANTANEOUS PROTECTION
GOLDE-PATENT MANUFACTURING CO. 531 W. 56th ST. NEW YORK.

The Pilot "THE CAR AHEAD"

Three Great Models: Pilot 40—Four cylinders, 4 $\frac{1}{2}$ x 5; brake test; 58 horse-power; 120" wheel base; price, \$2000. Pilot 50—Four cylinders, 4 $\frac{1}{2}$ x 6; brake test, 59 horse-power; 126" wheel base; price, \$2250. Pilot 60—Six cylinders, 4x6; brake test, 67 horse-power; 132" wheel base; price, \$2500.

The Car Without a Mechanical Defect
Teeter "T" head motors, full floating rear axles, Brown-Lipe differential, Warner transmission, Elsemann magneto, Stromberg carburetor, handsome jewel bodies with ventilating windshield. Completely equipped, with every convenience and comfort. Dynamo electric lighting and electric starter (Gray & Davis system), power tire pump. We have the greatest agency proposition in the United States.

Write for our beautiful art book showing cars in detail
PILOT CAR SALES COMPANY, Richmond, Indiana

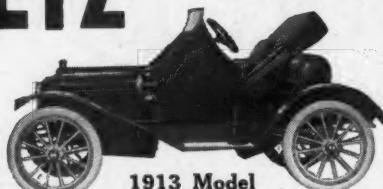
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The Truck with a reputation for
Economy Efficiency Durability
and Low Operating Cost. Our Trucks are used in sixty-one different lines of business.

Write for catalog and complete specifications
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GRAND RAPIDS MOTOR TRUCK CO.
GRAND RAPIDS, MICHIGAN

METZ "SPECIAL" \$395



COMPLETELY EQUIPPED

LEFT-HAND DRIVE CENTER CONTROL

22 $\frac{1}{2}$ H. P., 4-cylinder water-cooled motor, Bosch magneto, standard artillery wheels, best quality 30"x8" clincher tires, extension top, wind shield, five lamps, gas generator, tools, etc. Makes 5 to 32 miles on 1 gal. of gasoline. A thoroughly practical, fully guaranteed car. You can secure EXCLUSIVE SALE in your territory.

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Two Surpassing Models
\$1885 \$2250

The Standard Electric Car Co.
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"Always There"

SPLITDORF PLUGS are gas-tight, soot-proof and unbreakable and never need monkeying with. Insist upon SPLITDORF—they are STANDARD.

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98 Warren Street, Newark, N. J.

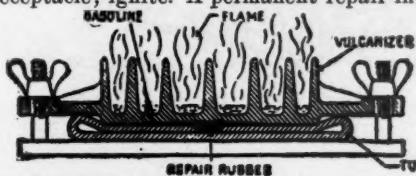
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We have had to double our gigantic output—and the demand is more than doubling. Nearly 180,000 have been sold and delivered. New prices \$525 to \$800. Dealers everywhere. Ford Motor Company, Detroit, Michigan.

How to Repair an Inner Tube in 15 Minutes

Directions: Place tube between plates of the Imperial Vulcanizer (see cut); tighten thumbscrews; put a little gasoline in pronged receptacle; ignite. A permanent repair in 15 minutes.



You can do this yourself at home or on the road—anywhere. The Imperial Vulcanizer saves time, saves money, is easy to operate, and pays for itself in a short time.

NICKEL PLATED PRICE \$3.50 Patent Pending
Complete with enough rubber for 40 punctures.
At your dealer's or sent by express.

Guaranteed to Satisfy or Money Refunded
McGRAW TIRE & RUBBER CO., Dept. C, East Palestine, O.

"THE STEADY HAND" HOFFECKER

"Hoffecker" on a speedometer means the best speed indicator that can be made.

The instrument requires no temperature compensation. The hand never wobbles; it is geared to the truth.

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1217 Huron Road..... Cleveland
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fit any style or make of tires. The side rings are reversible, they curve outward on one side to fit a straight side tire, inward on the other to accommodate a clincher. Two turns of a nut unlocks the rim for demounting, two more turns locks the rim in place.

Write for catalogue 606, which explains fully.



THE UNITED RIM CO., AKRON, OHIO

THE KENTUCKY THOROUGHBRED—"AMES 45"

Long stroke, powerful Continental Motor—Electric (Dynamo) Lights—Self Starter—Left Hand Drive—Full Equipment—"Amesbilt" Bodies and Tops. A combination of power, speed, endurance and graceful lines. Price, fully equipped, \$1,635. This is 1913's most remarkable car value. Backed by a reputation of 30 years, it will win you from the first inspection. We have a most liberal proposition for good, live agents. Send for catalog today.

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After his first use of Dixon's Automobile Lubricants wrote "I have never before experienced the sense of safety and lubrication surety that I felt to-day." Write for "Lubricating The Motor" and Sample No. 82-G.

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MORT ROBERTS

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HENDERSON

Real
Self-Starter
Dynamo
Electric Lights

THE Hendersons now offer a car which is \$715 ahead of its time. Long stroke motor, 3-point suspension, Stutz rear axle, 34"x4" tires, dynamo electric lights, demountable rims, real self-starter, 116" wheel-base, superior finish and luxury equipment. Five-passenger touring car, \$1485.

Dealers Write Today for Terms and Open Territory
The Henderson Motor Car Company of Indianapolis, Indiana, U.S.A.

Five Passenger
\$1485

With Complete Luxury Equipment



MYERS' MILITARY SEAT

MADE IN LARGE QUANTITIES BY THE BIGGEST MANUFACTURERS OF AUTOMOBILE TOPS IN THE COUNTRY and, therefore, made in a quality to support their reputation, and sold at a price consistent with their large manufacture. 36 in. x 15 in. in size. Any color leather. Full hair or spring cushion, including a cover when not in use. We can save you \$10 on this kind of seat.

Let us tell you more about it in our comprehensive catalog.

MYERS AUTOMOBILE TOP CO. DAYTON, OHIO

WINTON SIX

A Success Record Without Equal

Changes in models indicate that previous models weren't good enough. The Winton Six is now in its sixth year of success without requiring a single radical change. That's the greatest proof of merit the automobile world has ever seen. Shall we send you a catalog?

THE WINTON MOTOR CAR CO.
424 Berea Road, Cleveland, O.
World's First Maker of Sixes Exclusively

We Are the Largest and Oldest



Makers of Spare
Tire Cases,
Brackets, Lamp
Cases, &c., in the
United States.

The Gilbert Line is
Standard. Don't
accept Substitutes.

GILBERT MFG. CO., New Haven, Conn.
New York Store, 2010 Broadway, Cor. 68th St.

Make Our Booth Your Headquarters AT THE BIG SHOWS

Madison Square Garden, Coliseum,
New York, Jan. 11-18, 1913 Chicago, Feb. 1-8, 1913

You will enjoy the exhibition of the

Dreadnought Moline M-40 \$1950

Electric Self-Starter

Electric Lights

Now fully equipped: 5 passenger touring car or 2 passenger roadsters—full 40 H. P. Moline Long Stroke Motor. Unit power plant—3-point suspension—124-inch wheel base, top, windshield, speedometer—only \$1950.

Holds world's records for Reliability and Economy. Attractive open territory for live dealers. Send for printed matter.

MOLINE AUTOMOBILE CO.
101 Keokuk Street, East Moline, Illinois



"PITTSFIELD"

Spark Coils Are Dependable

They are long lived, water-proof, heat resisting, simple in construction and of low battery consumption. They give a spark that's a flame. Magneto, Coils, Plugs, Timers, Switches and other Ignition Goods.

Manufactured by

PITTSFIELD SPARK COIL CO. - Dalton, Mass.

AUBURN 1913

"Rides Like a Pullman—Pulls Like a Locomotive"

38 Years' Manufacturing Experience
Built Into Every Model.

Model 33M—Two Passenger Roadster; 33 H. P. long stroke motor (3 1/4 x 5 1/4)—Price, \$1150.

Model 33L—Five Passenger Touring Car; 33 H. P. long stroke motor (3 1/4 x 5 1/4)—Price, \$1180.

Model 40 A—Two Passenger Roadster; 40 H. P. long stroke motor (4 1/2 x 5)—Price, \$1650.

Model Six—50—Six-Cylinder Touring Car, 50 H. P. long stroke motor (4 1/4 x 5 1/4)—Price, \$3000.

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AUBURN AUTOMOBILE COMPANY, Auburn, Ind.

Studebaker

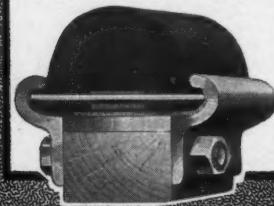
Three new models—the "25," "35" and "Six"—each the greatest automobile value ever offered at its price. Studebaker values are a sensation and Studebaker Dealers are justified in believing that this will be their biggest year.

The Studebaker Corporation - Detroit, Mich.

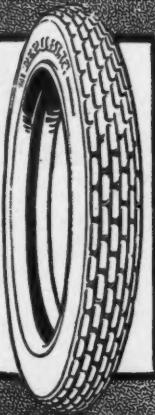
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Republic Staggard Tread Pat. Sept. 15-22, 1908

The tires you will find on the cars of experienced motorists who realize the necessity for a skid-proof, shock-absorbing, double-wear tire. We also make a complete line of Motor Truck tires, designed to give unexcelled service under the most trying conditions.



THE REPUBLIC RUBBER CO.
Youngstown, O.
Branches and Agencies in the Principal Cities



Croxton

Croxton cars incorporate all of the features for which the buyer looks in the new models.

Write for catalog and Agency details.

THE CROXTON MOTOR CAR CO.
WASHINGTON D. C.



500,000 Hoyt Meters in Successful Service

is the history of our progress for eight years.

70 per cent of the electrically lighted automobiles equipped with meters carry Hoyt. A striking proof of Hoyt quality and Hoyt service.



Ask for Bulletin 7

Hoyt Electrical Instrument Works
Penacook, N. H.

CONNECTICUT

Shock Absorbers



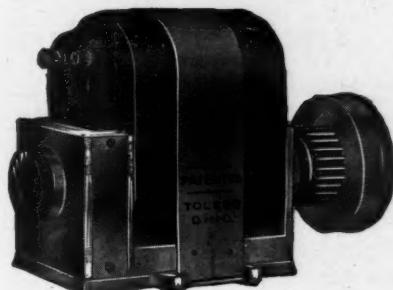
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"Make Every Car
a Parlor Car"

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ABSORBER CO., INC.
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THE LIGHT THAT ALWAYS SHINES



Electric light equipment for automobiles that is one-third more efficient for one-third less money than any other lighting system.

The Electric Auto-Lite Company 135 Michigan St. TOLEDO, OHIO

SEE
The **Inter-State** cars

at

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Space 29 Grand Central Palace
Chicago Show—Feb. 1st-8th, 1913
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INTER-STATE AUTOMOBILE CO.
2712 First Street
Muncie, Ind.

Imperial



Three Astonishing Prices—
SIX BIG FEATURES

Model 44.....\$1750	Four real doors, center control, si- lent enclosed motor, long stroke, demountable rims, big tires, long wheelbase.
Model 34.....\$1400	
Model 32.....\$1250	

IMPERIAL AUTO CO., JACKSON, MICH.

* the oil that lubricates most *

MobilOil

A GRADE FOR EACH TYPE OF MOTOR

If oil saves power it follows that one
oil saves more power than
another.

VACUUM OIL COMPANY
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The Gas Engine Handbook

By E. W. ROBERTS, M. E.

A very useful manual of information about American practice in the construction and operation of stationary gas engines, for the use of the designer and engineer. Very little space is wasted on past history, for the book is of and for today. It contains many useful tables and formulas, and a number of helpful drawings illustrate the text.

Size 8 1/2 by 5 1/2. Pages, 204. Flexible covers.....\$1.50

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910 South Michigan Ave., Chicago



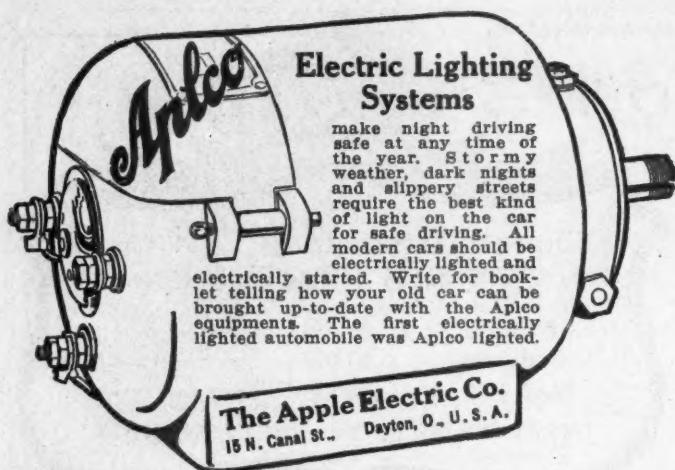
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The LAMBERT Model 99 (5-passenger touring car or 2-passenger roadster) at \$1,250 stands at the head of its price class. It comprises 4 1/8x5 1/4 Rutenber motor, 117-inch wheelbase, famous LAMBERT friction drive, one lever control, etc. Write for catalog.

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make night driving safe at any time of the year. Stormy weather, dark nights and slippery streets require the best kind of light on the car for safe driving. All modern cars should be electrically lighted and electrically started. Write for booklet telling how your old car can be brought up-to-date with the Aplico equipments. The first electrically lighted automobile was Aplico lighted.

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THE THOROUGHBRED

Roadster, \$950 Touring Car, \$1150
Six Cylinder Touring Car, \$1700

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HERRESHOFF MOTOR COMPANY
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Gives the motor the right mixture at varying speeds, is the most economical, reducing gasoline expense a full 25 percent. And with the MAYER you can get from 15 to 30 percent more power from your motor than with 90 percent of the other carburetors on the market.

Write for catalogue No. 26E and learn the merits of the MAYER.

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Baker Electrics

Pleasure Cars Trucks

Each carries the strongest and most significant guarantee ever placed upon a car of any make or type — the guarantee of Baker design, Baker material, Baker construction, Baker workmanship, Baker reputation.

Communications from Open Territory Solicited
THE BAKER MOTOR-VEHICLE COMPANY - - Cleveland, O.

WIRE WHEELS

Save Tires—Save Fuel—Save Car. Make cars easier riding and easier driving. Stronger than any other practical wheel.

THE McCUE CO., Buffalo, N. Y.



Give Full Value

For Every Cent Paid

Knight tires are sold at a price based on the character of the material used and the labor employed to make them. They wear longer than other tires and give greater riding comfort.

You get what you pay for when you buy Knight tires. Write today for descriptive literature.

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CANTON, OHIO

GASOLINE TURBINES

Half the size Half the weight
Half the fuel Half the friction

No Valves
No Springs

No Adjustment
No Fly Wheel
No Back Pressure

No Muffler
No Noise

There isn't much left
SMOOTH AS ELECTRIC

WILL REPLACE ANY ENGINE IN ANY CAR
BOOKLET UPON REQUEST

(Exclusive territory open for live agencies)

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Every Car Owner Needs Champion Priming Plugs
They Start Any Motor on First Quarter Turn

Mr. Dealer, you know that there are thousands of cars which cannot be started in cold weather without priming.

CHAMPION PRIMING PLUGS

are absolute winter necessities on cars without priming cocks, and they are often wanted badly on cars that have such devices.

FOR SALE EVERYWHERE AT \$1.25 PER PLUG



Trial set of four Champion Priming Plugs, fully guaranteed, prepaid to any car owner for \$5. Give name of car and year of make—also name of your dealer.

All jobbers and most dealers are already supplied. Write today. Liberal trade discount to dealers. Be ready to supply your trade in advance of our big advertising campaign in the great national weeklies.

CHAMPION SPARK PLUG COMPANY
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We Ship On Approval
PREPAY FREIGHT AND ALLOW
30 Days Free Trial

The best "Nonskid" puncture-proof device on earth for automobiles and motorcycles.

Try Them At Our Expense

Be your own judge—don't take anyone's word for it. "The proof of the pudding is in the eating."

IT ONLY COSTS ONE CENT to learn our unheard of prices and marvelous guarantee on Brictson Detachable Treads.

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The Brictson Mfg. Co.
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Bosch
Of Course

No matter what car you own or buy it needs a Bosch Magneto with Bosch Plugs.

Be Satisfied

Specify Bosch

Bosch Magneto Company, New York

GRAY & DAVIS



LIGHTING DYNAMO SYSTEM

Light your lamps (without battery connection), charges your batteries, operates power-horn, inspection lamp, etc. A complete system—not a makeshift.

Gray & Davis Products

Are supplanting oil and gas lamps wherever automobiles are used. Gray & Davis 6 Volt Electric Starter, Electric Lamps and Dynamo are Standard Equipment on America's leading cars.

GRAY & DAVIS, Inc., 55 Lansdowne St., Boston, Mass.
Manufacturers of Automobile Lamps, Dynamos and Electric Starters



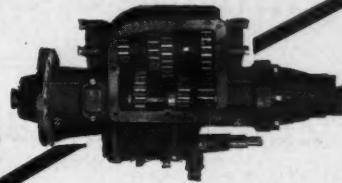
Transmissions
made by Specialists

COVERT TRANSMISSIONS GIVE perfect service, because they are designed and built by men thoroughly acquainted with every requirement that is made by a motor car transmission.

For Commercial Vehicles of from 500 to 10,000 lbs. capacity.

For Pleasure Cars of from 20 to 60 H. P.

Covert
Motor Vehicle Co.
Sales Office—Detroit, Mich.
Factory—Lockport, N. Y.



MR. SELLER, DO "MR. BUYER" a favor:

Sell him the car he naturally wants. Don't sell him the car he has to be educated to want. Sell him the car with the



BUDA



Model "T"

You don't have to "get at" a BUDA very often; but when you do, you'll appreciate its exclusive "get-at-ability."

All the details are yours if you write to

BRANDENBURG & CO.

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The Chicago Electric

A beautiful and classic equipage that stands unchallenged in point of constructional achievement

Chicago Electric Motor Car Co.

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Chicago

Great Western
FORTY
1913 FULLY \$1585 EQUIPPED
LUXURY — POWER
ABSOLUTE SILENCE
WRITE FOR OUR NEW CATALOGUE
GREAT WESTERN AUTOMOBILE CO.
DEPT. 20 PERU, IND.

CARTERCAR



Has an unlimited number of speeds—with one lever control. No gears. Will climb a 50% grade. Simple, reliable—and more efficient than is possible for a gear driven car. Five splendid models, \$1200 to \$2100. Write today.

CARTERCAR COMPANY

Pontiac, Michigan

Branches: New York, Chicago, Detroit, Kansas City

Schacht
THE CAR
THAT CAPTURED FIFTH
PLACE AT INDIANAPOLIS, MAY 30TH

Here is Model "N S" Electric Starter. Electric head lights, side lights and tail lamp operated with generator and storage battery. 30 x 4 demountable rims with one extra rim, folding zig-zag wind shield, trip speedometer, aluminum adjustable ventilator in windshield base, robe rail, foot rail, tire iron, horn, pump, all tools, jack and tire repair outfit. Price \$1850. Send for dealers' proposition.

THE SCHACHT MOTOR
CAR COMPANY
2817 Spring Grove
Avenue
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ZENITH

gives

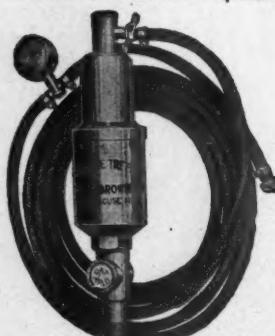
Standard Carburetion

ZENITH CARBURETOR CO.
DETROIT, MICH.

STUTZ
No Car Has Anything on the STUTZ
Here is a car that is practical, sturdy and road-worthy—a sensible car at a sensible price. Write today for advance Booklet A-2 Sturdy STUTZ Announcement, Series B.

IDEAL MOTOR CAR CO.
Manufacturers of Stutz Cars
Indianapolis
Indiana

"THE BEST \$15.00 I EVER SPENT!"



That's the evidence of thousands of users of

THE BROWN IMPULSE TIRE PUMP

Better, quicker inflation—no effort—longer lived tires.

If you don't use a Brown you don't know how simple, rapid and efficient a tire pump can be.

Ask your dealer or
write us

The Brown Company
1090 South Clinton Street
SYRACUSE, N. Y.

Patented Nov. 5, 1912.
Other Patents Pending.

Oakland

"The Car With A Conscience"

Write for 1913 Catalog

Four and Six Cylinder Models
\$1000 to \$3000

OAKLAND MOTOR CAR COMPANY
100 Oakland Boulevard
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The U-S-L Electric Starter & Lighter takes the place of the fly-wheel.

The U-S-L Storage Battery (vehicle type) insures lively electric cars and powerful and economical trucks.

The U-S-L Storage Battery (sparkler type) means a never failing spark for engine ignition.

The U. S. Light & Heating Co.

General Offices: 30 Church St., NEW YORK CITY
BRANCH OFFICES AND SERVICE DEPOTS
NEW YORK BOSTON BUFFALO CLEVELAND DETROIT ST. LOUIS CHICAGO

Motor Car Manufacturers Since

1893

HAYNES

1912

Occupying the newest and most modern automobile manufacturing plant in America.

HAYNES AUTOMOBILE CO., Dept T-3, Kokomo, Ind.

Model "P"

Five

Passenger

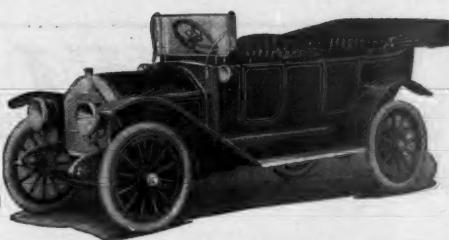
Touring

Car

Four-Cycle

Four

Cylinders

4 1/2 x 5 1/4
inches

ENGER THE CAR OF VALUE™

Positive electric starter, electric lights all around and electric horn. Unit power plant, enclosed valves, three point suspension. Wheel base 120 inches, full floating rear axle, $\frac{3}{4}$ elliptic rear springs, demountable rims with 38x4 tires, straight line bodies. Made in three models. Speedometer with grade indicator and eight-day clock with electric light—"Everything you need in a car."

New Catalog tells all about the Enger—"The Car of Value." It's of interest to both Dealers and Individuals. Write for it today.

THE ENGER MOTOR CAR CO., 2101 Gest Street, Cincinnati, O.

40 H. P.

Long

Stroke

Motor

Price

\$1750.00

Cylinders

Cast in

pairs $\frac{1}{2}$

inch offset

WHERE'S YOUR "SIX" FOR 1913?

Every progressive manufacturer announces a "Six" for 1913. The supremacy of the "Six" is established. It has come to stay. Sooner or later you have got to add a "Six" to your line. Competition will force you to it. Why not now? Your 1913 "Six" at from \$1600 to \$2000 will prove a self-seller if equipped with a

Beaver "Six" Unit Power Plant

With cylinders $3\frac{1}{2} \times 5$ inches this motor has the much desired long stroke and just the right power—40-45 H.P. Valves are extra large, and the enclosed valve action is noiseless. Transmission unit enclosed with motor has plate clutch and 8-speed forward selective sliding gear-set. Write for catalog of motors and prices.

BEAVER MFG. COMPANY
2800 First Avenue, MILWAUKEE, WIS.

LAUTH-JUERGENS

One, Two, Three and =Five Ton Trucks=

"Guaranteed for Life"
"Guaranteed Service"

The Lauth-Juergens Motor Car Company, Fremont, Ohio

Reo the Fifth

Final and crowning achievement of R. E. Olds, pioneer designer of autos. A standard size 30 to 35 horsepower four-cylinder car of modern refinements priced at only \$1095.

R. M. OWEN & CO., General Sales Agents
REO MOTOR CAR CO., LANSING, MICH.

BEST
GRADE—
"CHROME
VANADIUM"



NEXT
BEST—
"SPECIAL
ANALYSIS"

"THOSE EASY RIDING CLEVELAND-CANTON SPRINGS"

Both makers and purchasers of either personal or commercial cars will be interested to investigate, from our literature, why Cleveland-Canton Automobile Springs are so easy-riding, flexible, resilient, yet so strong and serviceable that under our rigid inspection and test system they will stand 40 tons pressure to the square inch without taking permanent set. Oil tempered—not merely oil flashed or water chilled.

Address for prices (22)

THE CLEVELAND-CANTON SPRING COMPANY, CANTON, OHIO

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Auto Clé Wrench Set



Trade Mark Reg'd
U. S. Pat. Office

Finest case-hardened steel guaranteed
At any dealer's, or write to us
Best Dealers' proposition on the market.
Write for information.

MOTOR PARTS CO., PLAINFIELD, N. J.

Essential Equipment for
every automobilist.

Flat-folding (or offset) handle and thirty interchangeable sockets. Fits every bolt and nut on any car. Makes every part accessible. Special spark-plug socket.

"Pass Them All"



Motor Cars

Send for Pleasure or Commercial Catalogue.

KNOX AUTO CO., SPRINGFIELD, MASS.

The Norwalk Underslung Six for 1913

THE CAR OF ABSOLUTE EXCLUSIVENESS

2 Passenger Roadster.....	\$2,900.00
4 Passenger Roadster.....	\$3,000.00
6 Passenger Tourer.....	\$3,100.00

COMPLETE EQUIPMENT, INCLUDING
ELECTRIC LIGHTS, SHOCK ABSORBERS, ETC., ETC.

The Norwalk Motor Car Co., Martinsburg, W. Va.
NEW YORK OFFICE EXPORTING DEPARTMENT
17 Battery Place
New York City, N. Y.

*For Speed, Capacity and Results—
Let the "Old Reliable"*
Reduce Your Haulage Costs

Write today for the "Old Reliable" Test-of-Service Proposition and learn *how and why* this husky 3½ and 5-ton truck sells itself to men and firms who demand results. Commercial concerns or dealers are urged to send for special descriptive literature.

OLD RELIABLE MOTOR TRUCK CO.
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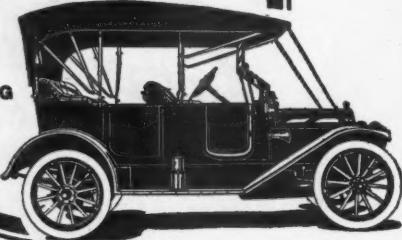
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Price \$20

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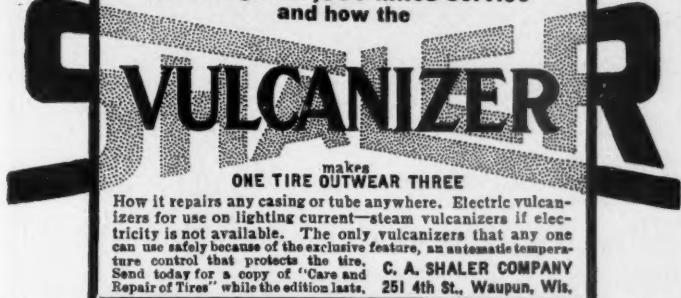
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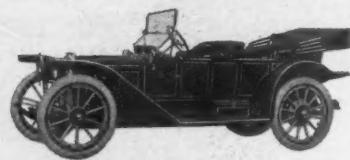
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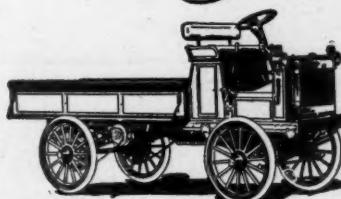
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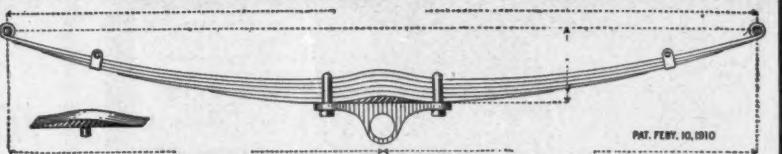
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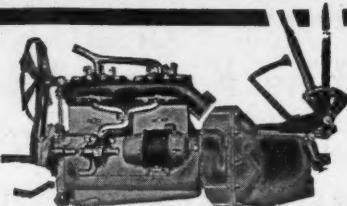
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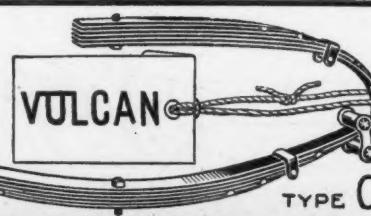
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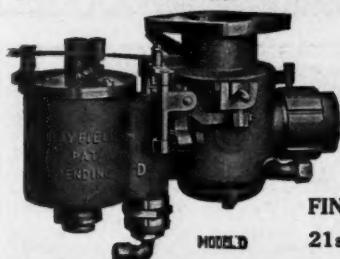
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A Tire Reinforcement
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All that the name implies
 Prime your engine and
 clean your plugs at the
 same time.

Price \$1.50 each

**Powerful
 Sootless
 Durable**

Designed and constructed for use with high or low tension magneto and battery ignition systems. Made to fit any engine.

We shall prosecute vigorously all infringements now on the market or any which may spring up in the future.

FRONTIER SPECIALTY COMPANY
 707 Main St. Buffalo, N. Y.

CLASSIFIED ADVERTISEMENTS

The Trading Center
of the
Motor Car Industry

MOTOR AGE

Rates-20¢ per line
6 words to a line

Cars For Sale

A NICE RUNNING 1910 CADILLAC, nickel trimmings, well equipped; price, \$650. Call 529 Hamilton Bldg., Portland, Ore.

A SPECIALLY BUILT SEVEN-PASSENGER touring car, very powerful, special motor 5 1/4 x 6, 140" wheel base, wheels and tires 37x5 1/2, built on the latest lines, completely equipped as to accessories, with 2 extra tires and 4 tubes. Write for price. B. A. Gramm, Box 600, Lima, Ohio.

AUTO RACING TEAM FOR SALE—WILL sacrifice my special built racing team, three of the fastest cars in the country in perfect condition. One 40 h. p., one 50 h. p., one 150 h. p. French exhibition car, and can prove to you that this team is a money-maker. Extra magnetos, carburetors, crank cases, timing gears, tires and full racing equipment. Would prefer selling these cars together, as it would be a shame to break up this team. For full particulars, address C. H. K., 6128 Prairie Ave., Chicago, Ill.

A 7 PASSENGER, 40 HORSE POWER White Steamer and one 20 h. p. 4 pass. Both machines like new. Joy valve engines, kerosene burners, operating for one-half cent per mile. Address Box D 151, c/o Motor Age.

COLE, MODEL CC, FOUR PASSENGER, fully equipped, top, windshield, electric lights and horn, \$125. Stewart tachometer, 37x4 1/2-inch tires, extra tire, chains, etc. Painted white, striped in brown to match brown Spanish upholstery. Car has run less than 8,000 miles. Special reason for selling. Price \$1,000. P. O. Box 596, Indianapolis.

FAL CARS AND REPAIRS F. A. L. Auto Co., 4052 Princeton Ave., Chicago. Phone Drover 1712.

FOR IMMEDIATE CASH—REBUILT POPE-Hartford, Elmore and Chalmers. Full information and prices on request. Also second-hand Rainier, \$100; Thomas, \$450; Ford, 2-cyl., \$75; Maxwell Runabout, \$125; Rambler 2-cyl. delivery, \$125. E. S. Youse Company, 46 N. 5th St., Reading, Pa.

FOR SALE—COLE, MODEL DD 1912, seven-passenger, fully equipped, top, windshield, speedometer, two extra casings, inner tubes, electric lights, etc. Car has run less than 6,000 miles, good as new. Special reason for selling. Price \$1,100.00 f. o. b. Indianapolis. Guaranteed as represented. P. O. Box 596, Indianapolis.

FOR SALE—FIVE PASSENGER DREAD-nought-Moline; run 6,500 miles. Car is guaranteed. Horst & Strieter Co., Rock Island, Ill.

FOR SALE—MODEL "A" BABY MAX-well; 3 new tires, top, and equipment; perfect running order, \$135.00 cash. Ebelen, 25 Whitehall Terrace, Atlanta, Ga.

FOR SALE—ONE 1911 CADILLAC, FORE-door touring car, in elegant condition, equipped with 37x4 1/2 tires, windshield, combination oil and electric side and tall lights, speedometer, Ten Eye tire pump. Has run approximately 10,000 miles. A great bargain. Address Box D 223, c/o Motor Age.

FOR SALE—WHITE STEAM CARS, VARIOUS models, in excellent condition; also parts for steamer engines and generators. We specialize in steamers. Joseph Libal, 3145-53 N. Halsted St., Chicago.

FOR SALE—4-CYL., 50 H. P. UNDERTAKER's wagon; reas.; fine mech. condition. 1524 W. 51st St.; Drover 1540; Chicago, Ill.

FOR SALE—5-PASSENGER TOURING CAR—Maxwell, Model K—30 h. p.; first-class condition; \$300. Call on or address A. D. Spencer, cor. Second St. and McKean Ave., Charleroi, Pa.

FOR SALE—20-PASSENGER SIGHTSEEING car; good condition. Cheap for cash. Box D 140, c/o Motor Age.

FOR SALE—1911 MODEL STODDARD—Dayton automobile, 7-passenger, 50 h. p., equipped with all auxiliaries. In perfect condition. Address Box D 220, c/o Motor Age.

GOING TO BUY A USED CAR? Let us send you the names of individual owners. Free weekly report gives complete descriptions, prices, etc. Save money by dealing direct. Write now.

Auto Reports Bureau,
310 Shops Bldg., 19 N. Wabash Ave., Chicago.

MITCHELLS REBUILT, GUARANTEED. These cars are fully equipped. Call or write for further particulars.

Mitchell Automobile Co.
2334-36-38 Michigan Ave., Chicago.

NEW REO 1,500-POUND TRUCKS, WITH tops, \$650 each.

Gibbs Machinery Co., Columbia, S. C.

PEERLESS 1910 TOURING—7 PASSENGER—guaranteed like new. Cost \$4,800; sacrifice \$1,200. Cooke, 127 W. 64th St., New York City.

MOST SENSATIONAL AUTOMOBILE

Bargain Ever Offered.

1912—New—1912
Regular Price, \$1,950
Our Price \$1,085

These cars were ordered by a large export house, but owing to the Balkan-Turkish war they have preferred to forfeit a substantial deposit rather than ship automobiles to the continent in the present unsettled condition of affairs.

We have taken this contract off their hands and are offering these new high grade cars at practically

One-Half the Price. The manufacturer having agreed with us that if we did not use his name in our advertising, he would continue the regular guarantee on these cars, which is

Guaranteed for Life. So, therefore, we are not mentioning the name of the car, but the name will be sent you on request. Upon receipt of this information, ask anyone who ever owned one of these cars, and they will tell you there is

No Better Car Made. And they will never give you a minute's trouble. We have them on exhibition in our showroom, 1210-1212 Michigan Ave. If you have failed in the past to avail yourself of one of the many bargains we have offered the trade and public from time to time on new cars, DO NOT LOSE THIS, as it is the GREATEST BARGAIN EVER OFFERED. ACT QUICKLY. At the low price we sell our merchandise, we must move them quickly—and we do. They are one of the most beautifully designed and easy riding cars built, being light in weight and extremely attractive.

Here are a few of the interesting features. For instance:

A 4 1/2 x 5 1/2 four-cylinder, long stroke Continental motor, equipped with magneto and battery system. A chassis, with oil-tempered springs, chrome nickel steel shafts, Timken roller and Schaefer annular ball bearings throughout; full floating type rear axle, a multiple disc clutch; extra large, strong artillery wheels; oversized tires, 36x4, equipped with Universal demountable rims. Wheel base 120". Also a big, roomy, ventilated fore-door body, flush side, painted, trimmed and upholstered with the greatest care. The latest electric light system.

TIMES SQUARE AUTOMOBILE COMPANY
Largest Automobile Dealers in the World
1210-1212 Michigan Ave., Chicago, Ill.
Open Sunday till 4 P. M.
Open Evenings till 9 P. M.

HARRISON AUTO EXCHANGE

61 Northampton St.,
Boston, Mass.

Open Evenings till 9 P. M. Tel. Rox 22624. Five minutes' ride from any depot, get on to an elevated train, ride to Northampton St., walk down to Harrison Ave.; we are at the corner, and have a number of runabouts, touring cars, trucks, motorcycles; if you have a car to sell, we can sell it; if you want a car and looking to save money, kindly call and we will convince you that we can sell cars at a lower price than any place in Boston.

LATE MODEL PAIGE-DETROIT ROADSTER fully equipped in good mechanical condition. Will sell at a very low price. The White Co., 2635 Wabash Ave., Calumet 5311, Chicago.

ONCE AGAIN

We offer the greatest
AUTOMOBILE BARGAIN
That has ever reached Chicago.

A New \$1,500 Roadster,
Our Price, \$875.

Again it is one of the best known cars on Michigan Ave. It is strictly up-to-date, comes fully equipped and is generally admitted to be one of the classiest roadsters on the street.

There are only a very limited number and we regret to say that many of our friends and customers are going to be disappointed in not being able to get one.

We take this occasion to impress upon you the necessity of buying at once if you have any intention of getting in on our latest and what we consider the best bargain ever offered.

Look over these specifications. Motor, 4 cylinder, 30 H. P., bore 4 1/2, stroke 4 1/2, valves 2 1/2 in., connecting rod bearings, 1 1/2 in., constant level oiler with sight feed on the dash, operated by plunger pump.

Transmission—Three speeds forward and one reverse, with Schefer annular ball bearings.

Clutch—Multiple disc, running in oil. Rear Axle—Full floating, with nickel steel gears and shafts. Timken roller bearings throughout. 12-in. internal expanding brakes. Pressed steel brake drums and hubs. Drop forge driving flanges.

Front axle—Drop forge I-beam, Timken bearings.

Springs—Front, 38 in.; rear, 44 in. Wheels—34-in., with demountable rims. Wheel Base—110 in.

Ignition—Splitdorf dual system. Equipment—Electric lights, 100 ampere battery, mohair top with side curtains and boot, zig-zag shield, speedometer, horn, complete tool kit, and nickel finished throughout.

There are many other features that we would like to specify, but space does not permit. Come and see these cars at once. By getting your order in now you will secure one. A day or two late may deprive you of the greatest roadster bargain that we have ever offered.

REMEMBER THIS IS
A \$1,500 new roadster, guaranteed for life, that we are offering for \$875.

TIMES SQUARE AUTOMOBILE COMPANY
1210-1212 Michigan Ave.
Chicago, Ill.

PACKARD DEMI-LIMOUSINE; BEST OF condition. Krit coupe, just overhauled and painted, for sale cheap. Ajax Auto Co., 834 E. 43d St., Chicago.

PREMIER
Rebuilt cars like new.
Must sell quickly to make room for new
Models.

1912 Welch 1910 Winton.

1911 Chalmers 1909 Peerless.

Will make special price to move these cars.

The Quality Car Co.,

2329 Michigan Ave., Chicago.

Cal. 4501.

SEE THESE BEFORE YOU BUY; NO JUNK—Must be seen to be appreciated: Baker Electric Coupe, looks like new.... \$500 Columbia, Electric Coupe, rebuilt..... 500 Maxwell Touring Car, rebuilt..... 550 Maxwell Runabout, in fine condition.... 350 Warren-Detroit, 30 h. p., 5 passenger.... 475 Overland, 30 h. p. roadster, good order.... 375 6131 Cottage Grove Ave., Chicago.

SPEED-RATE OF 100 MILES AN HOUR—guaranteed—Stanley Racer—low price. Excellent condition. O. P. Tyler, 31 Central St., Worcester, Mass.

THREE-TON GRAMM AND FOUR-TON—Knox Trucks, \$2,250 and \$2,750; will trade for Coast real estate. Clarke, 529 Hamilton Bldg., Portland, Oregon.

1909 FOUR-CYL., 40 H. P. WINTON; NEW tires; completely equipped; \$400. Address Box D 224, c/o Motor Age.

1910 AMERICAN—SEVEN PASSENGER, 50 h. p.; overhauled; new top; \$800. Address Box D 227, c/o Motor Age.

1910 CHALMERS 30—REPAINTED, NEW top, new tires; \$700. Address Box D 226, c/o Motor Age.

1911 CHALMERS 30—4-PASSENGER; NEW tires; complete equipment; \$700. Address Box D 228, c/o Motor Age.

1912 CHALMERS 30—RUN ONLY 4,500 miles; fine shape; \$1,000. Address Box D 228, c/o Motor Age.

1912 COLE 40—5-7 PASSENGER, completely equipped, including electric lights and extra seats. Repainted. Tires nearly new. \$1,140.00. O. C. Peterman, Jamestown, N. Y.

4-20-PASSENGER AUTOMOBILES IN A-1 condition, have been operated between city and summer resort, conditions have changed is reason for selling them. Address 47 Highland Terrace, Brockton, Mass.

7-PASSENGER FRANKLIN, 6 CYLINDERS. Cost \$4,250. Splendid condition, \$1,000. Bond Motor Co., 1615 Grand, Kansas City, Mo.

Cars Wanted

AUTOMOBILE WANTED—WILL TRADE a tract of A1, well located, high, pine trees fruit land for 5-passenger car in good condition. Address J. Walker Pope, Winter Haven, Fla.

CARS WANTED. Want Ford, Buick or other light car. Will trade small screw machine, typewriter, pulleys, belting, hangers, small motor, watchman's clock, power blower. Best car gets outfit. Address P. O. Box 112, Anderson, Indiana.

EXCHANGE 5c AND 10c HABANA CIGARS at wholesale price for auto in good condition. H. Raverty, New Albany, Ind.

TO EXCHANGE—MOTORCYCLES FOR runabout. Wolke Cycle Co., Louisville, Ky.

TOURING CAR WANTED—HAVE TO EX- change a good single cylinder Reo Runabout, in good condition and 75-foot frontage in live Iowa town of 2,500. Real estate has water on it and cement walks (no buildings); value \$850, cash. Want even trade; full description first letter. Address Box 4, Center Junction, Iowa.

WANTED—FOUR-CYLINDER RUNABOUT. Wolke Cycle Co., Louisville, Ky.

WANTED—SMALL RUNABOUT IN EX- change for choice corner lot in city of Moffat, Colorado. Beede, Vermillion, S. D.

WANTED—1912 AUTO IN EXCHANGE for 160 acres good Minnesota land. Address Box 414, Marshalltown, Ia.

WE BUY AND SELL YOUR AUTOS FOR cash. If you have a Touring Roadster, Limousine, Taxicab, Commercial Car, Truck or Sightseeing Car and desire to dispose of it quickly, communicate with us. Give us full description. Late models and in good condition. Strictly business. Enclose stamp for reply. Universal Auto Sales Co., 1826 Wood Ave., Harrisburg, Pa.

Parts and Accessories FOR SALE

A BARGAIN—TWENTY SETS OF MARSH Rims, Q. D., size 36x4. Twelve Bodies—four and five passenger—high grade. The Sebring Motor Car Co., Sebring, Ohio.

A BATTERY BARGAIN—6-80 STORAGE batteries, Exide, Vesta, National, Universal, for auto igniting and lighting. \$1.50 to \$7.50. 4105 Cottage Grove Ave., Chicago.

A LIMITED NUMBER OF NEW HIGH grade 25-30 and 30-35 h. p., four-cyl. motors with Remy magneto and coil. Only a few left. Prices very low. F. E. Alford, Goshen, Ind.

ALL NIGHT MACHINE AND GARAGE CO. Shop operated every hour of every day. No extra charge for night work. Make any part for any car. We hurry up. 7031 So. Chicago Ave., near Cottage Grove Ave., Chicago. Dan Morgan Smith (owner); Ph. Normal 3266.

ALUMINUM VULCANIZERS FOR BOTH casings and tubes. \$2.00 prepaid to any address. Money back if not satisfactory. Truscott Supply Co., St. Joseph, Mich.

ATTENTION—HENRY OWNERS

Having purchased the repair business of the Henry Motor Co., we are prepared to fill orders promptly for repairs for Henry cars. Muskegon Automobile Co. Muskegon, Mich.

AUTOMATIC ENGINE STARTERS (Spring), guaranteed; \$100 to \$125. J. W. Tudor, 35 Congress St., Boston, Mass.

AUTOMOBILE BODIES, PLEASURE AND commercial.

Foredoors for open-front cars. Write for prices.

Auto Specialty Mfg. Co., 326 E. Market St., Indianapolis, Ind.

AUTOMOBILE SELF-STARTER For \$1. Will send you details of a reliable self-starter that can be put on a 4-cylinder car at a very small cost. Simple and effective. H. & B Auto Co., 928 Waverly, Houston, Texas.

A WET CLOTH AND A PACKAGE OF Ar-Gen-Tor is all that you need to plate all the brass trimmings on your car with a heavy, permanent plate of pure silver. Your car will always look new, and you will not have to polish brass any more. Does not contain mercury or poisonous cyanide. Send \$1 today for large size box.

Forest City Sales Co., Fremont, Neb.

PEERLESS AUTO TOP DRESSING.

A waterproof dressing for leaking mohair and duck tops and curtains. Makes old and faded tops look like new. Ask your garage and supply dealer for it.

The Columbus Varnish Co., Columbus, O.

BALL & ROLLER BEARINGS, ALL TYPES.

Distributors of "F & S" Ball Bearings. "New Departure" Ball Bearings. "Pressed Steel" Ball Bearings. "Standard" Ball and Roller Bearings. **BALL BEARINGS REPAIRED** THE GWILLIAM COMPANY, New York—Broadway, at 58th St. Philadelphia—1314 Arch St.

BODIES, FOREDOOR, TOURING RUNABOUT, \$15.00 to \$50.00. Fenders painted dark blue, \$10.00 set of 4; Selective type 4 speed shifting levers, complete with emergency brake lever, \$8.00. Other bargains. Automobile Appliance Co., 1712 Michigan Ave., Chicago, Ill.

CELLOLUSIA—BEST SUBSTITUTE FOR glass used in automobile and buggy storm fronts, side curtains, etc. Sheet 20x36 in., 85 cents; 12x20 in., 35 cents, postpaid. Hawes Storm Front Co., Coldwater, Mich.

CHEAP—TO QUICK PURCHASER—4-, 5- and 7-passenger aluminum touring bodies. Also a few panel delivery bodies for cars of about 100" wheelbase.

SWEETEN AUTOMOBILE COMPANY, 3430 Chestnut St., Philadelphia.

CUT-OUTS E.M.F., Flanders, Buick, Regal, etc. Complete outfit with brass lock, open pedal, \$1.50. Lincoln Machine Shop, Lincoln, Ill.

PEERLESS BACK & CUSHION DRESSING

Softens the leather and will not crack, wash or rub off. Makes old leather look like new. Dries in twenty minutes. Ask your garage or supply dealer.

The Columbus Varnish Co., Columbus, O.

When Writing to Advertisers, Please Mention Motor Age.

DETROIT FORE-DOORS

for
E-M-F, Ford and Hudson.
One piece aluminum; immediate
shipment subject to inspection.
Detroit Fore-Door Co.,
564 Porter St., Detroit, Mich.

DISCO SELF-STARTERS

For Sale. Only a few. Equip your car with a self-starter for this winter. Guaranteed new stock. List price, \$50; our price, \$12.50. Parsons Sales Co., 1817 Grand, Kansas City.

"DON'T ENVY A SMOOTH RUNNING MOTOR, use Hagstrom Spark Plugs and have one." Write for gas tank key and price list to The Hagstrom Bros. Mfg. Co., Inc., Lindsborg, Kan.

DON'T GET COLD FEET!
Use Our Heater.
For full particulars write to
Garrison Gasoline Engine Specialties Co.,
251 Richmond Street,
Desk 1, Philadelphia, Pa.

DRAGON REPAIR PARTS.

We manufacture and keep on hand all repair parts for the Dragon cars. We make a specialty of repairing this machine. Philadelphia Machine Works, 67 Laurel St., Philadelphia, Pa.

ELECTRIC LIGHTING EQUIPMENT.

We can furnish a complete system for \$36. This outfit consists of one 6-volt, 140-ampere battery, two head lights, two side lights, one tail light, wire for car switch and bulbs. Head lights are 10-inch solid brass with silver plated parabola reflectors, and side lights are 5-inch same material. The Ampco Battery Co., 1607 Michigan Ave., Chicago, Ill.

E. M. F. PUSH ROD ADJUSTERS

\$1.50 for complete set delivered. Money back guarantee. Auto Parts Co., Providence, R. I.

PEERLESS EXTRA FINE BLACK BAKING Japan.
Bakes either to a high gloss finish, eggshell gloss or dull finish on lamps, radiators and fenders. Will not crack, chip or peel. Ask your garage and supply dealer.

The Columbus Varnish Co., Columbus, O.

FORD, BUICK, OVERLAND, E-M-F, MAXWELL, REO, CHALMERS, MITCHELL, AIR-FRICTION Carbureters, drive your cars three miles per hour on high. Much more speed; much less gas. Our new Model B starts easy in zero weather. Satisfaction or refund money. Air-Friction Carbureter Co., Dayton, Ohio.

FORD, HUPP AND MAXWELL

Muffler cut-out machined ready to attach, including lock, open pedal string and cables, \$1.35. Lincoln Machine Shop, Lincoln, Ill.

FORD FAN BELTS—WOVEN COTTON and silk; outlasts six regular belts. Postpaid, 75c. Dealers write. Angier's, Streator, Ill.

FORD OWNERS

A postal brings you our 1912 catalog of 22 necessities for your car. Auto Parts Co., Providence, R. I.

FORD OWNERS AND DEALERS!

You will save trouble and money by installing our timer elevating device.
Ford Parts Specialty Co., 1211 Main St., Richmond, Ind.

FORD OWNERS—SPARE WHEEL FOR Fords, save tire trouble. It's new; write Angier's, Streator, Ill.

FORD OWNERS—TOWNSAN VALVE ADJUSTERS will quiet your motor. \$1.50 by mail. Townsan Auto Specialty Co., Mitchell, S. D.

FORD T OWNERS

Foot throttle or accelerators, \$1.50. Lincoln Machine Shop, Lincoln, Ill.

FORE DOORS

Made for all makes of cars. Prompt shipment guaranteed. F. E. Dertz Co., 2503 E. 55th St., Cleveland, O.

FOR QUICK SALE

We are offering the following articles, of which we have a limited quantity left, subject to prior sale.

Bosch DU-4 type 5, high tension magnetos	\$25.00
Splitdorf Model "X" magnetos with coil.	20.00
Herreschoff runabout bodies with cowl dash	30.00
Herreschoff touring car bodies	40.00
Flanders suburban tops	13.50
Windshields, Sterling (\$25.00 kind)	6.00
34x4 wheels, with demountable rims, complete	(Per set) 12.00
Barnes steering gears, 17" wheel	10.00
Mayer 1 1/4" carburetors (new)	3.50

Write us about your requirements.

AUTO PARTS MFG. CO.,

Detroit, Mich.

FOR SALE—AUTO BODIES, FORE DOOR, new, \$60.00 to \$95.00. Motors, Axles, Auto parts and accessories. Closing out factory stock.

Independence Motors Co.,
Detroit, Mich.

FOR SALE—COUPES FOR IMMEDIATE delivery. Stylish, up-to-date and well constructed. Fit almost any car. Write us. Robbins & Co., Indianapolis, Ind.

FOR SALE
Fore Doors for all cars.
Overland Detachable Tonneaus
Ford Detachable Tonneaus
Ford Coupe Bodies
Top Delivery Bodies
Four-Passenger Bodies
Frames and Dashboards
14-gallon Gasoline Tanks
Rumble and Surrey Seats
Special Seats, Tonneaus and Bodies for all cars.
The Metal Body, Tank & Fender Co., Cleveland, Ohio.

FOR SALE—NEW UNIVERSAL DE-mountable rims, 5 to a set complete, \$10; 32x3 1/2; 34x3 1/2; 34x4; 34x4 1/2. Triple Action Spring Co., 215 E. 21st St., Chicago.

FOR SALE—ONE LIMOUSINE BODY FOR Stearns 30-60 chassis. Body cost \$1,750 when new; used one season and in perfect condition. Price, \$800 f. o. b. Louisville. Louisville Lozier Company Louisville, Ky.

FOR SALE—TWO WORM DRIVE REAR Axles, designed to carry 5,000-lb. load—made by Morse-Williams Division of Otis Elevator Co., Philadelphia, Pa. Have never been in service. Make us an offer for them. Sheldon Axle Company, Wilkes-Barre, Pa.

FOR SALE—30 MODEL "38" OVERLAND bodies with detachable tonneau, never been used before, \$15 each. F. E. Lortz Co., 2503 E. 55th St., Cleveland, Ohio.

FRAMES, 34-INCH WIDE—112 W. B.
straight, each \$10.00
Frames, 36-inch wide — 112 W. B. straight, each 12.00
Frames 36-inch wide — 124 W. B. straight, each 14.00
Unassembled frames—Kickup 112-inch W. B., 34-inch wide, each 8.00
For assembling each 4.00
Wheels—34x3 1/2, 32x3 1/2, 36x4 1/2, per set. 12.00
Axles—40-50 H. P. rear, each \$45.00 50.00
30-40-50 H. P. front, each 12.00
Radiators, 30 H. P., honeycomb, each. 14.00
Address Box D 169, c/o Motor Age. J

LIMOUSINE AND LANDAULET BODIES
At Reduced Prices.

High grade make and latest styles, will fit any standard chassis. We do mounting, painting, and turn out complete jobs, at a saving of 30 per cent.

Pacific Motor Car Exchange Co.,
229 W. 54th St., New York.

PEERLESS EXTRA FINE BLACK JAPAN.

Covers solid, one coat for enameling lamps, radiators and fenders. No undercoat required. Heat does not affect it. Ask your garage and supply dealer.

The Columbus Varnish Co., Columbus, O.

JANUARY BARGAINS

3—Rambler 2 cyl. radiators \$10.00
2 Cyl. Rambler motor and trans. 50.00
2 Cyl. Ford motor and transmission 40.00
4 Cyl. Beaver motor, 4 1/2" bore 75.00
4 Cyl. Unit power plant, disk clutch, electric transmission, 30 h. p. 150.00
New mohair tops, for Buick 10, Flanders 20, Ford, N. S. & R. 13.00
Pressed steel frames—10 sizes 3.00 up
34x3 1/2 & 36x3 1/2 wheels, O. D. clincher rims, 10 and 12 1/2" spokes... (set 4) 10.00
Before buying, see our list.

AUTO PARTS CO.

513 to 531 Jackson Blvd., Chicago.

MAXWELL PUSH ROD ADJUSTERS

\$1.50 for complete set delivered. Money back guarantee. Auto Parts Co., Providence, R. I.

MORA REPAIR PARTS

We purchased the repair business of the Mora Company, and have in stock repair parts for all models of Mora cars. Philadelphia Machine Works, 67 Laurel St., Philadelphia, Pa.

NEW COUPE BODIES FITTED TO CAR, \$250. Send for photo.
Fred Allen Auto Supply Co.,
1610 Michigan Ave., Chicago, Ill.

NICKEL PLATE YOUR AUTO TRIMMINGS with Electro-Knickel. Prevents brass from tarnishing, iron from rusting. This is not a silver or mercury wash. We guarantee it plates (without a battery). Price \$1.00, express prepaid. Write for information. Gun Metal Finish Co., 313 Powers Blk., Decatur, Ill.

NEW UNIVERSAL DEMOUNTABLE RIMS, 5 to a set complete, at \$6.00, in sizes of 34x4, 36x4, and 36x4 1/2. Write for our rim part circular. Kastner Tire & Rim Co., 2112 Michigan Ave., Chicago, Ill.

PEERLESS LEATHER TOP DRESSING.

An oil preparation that softens the leather and pantasote. Makes old tops look like new. Ask your garage and supply dealer for it.

The Columbus Varnish Co., Columbus, O.

QUICK SALE

Liquidation & Realization Corporation.
One lot new Victor Presto Self-Starters.
One lot Leader Vulcanizers.

Leader Vulcanizer—We have been fortunate enough to secure for quick realization a large lot of Leader Steam Vulcanizers. Double your tire mileage. Leader Steam Vulcanizer will do it. It is the factory process put into a portable size. You do not have to remove the tire from the rim—can be operated on the road if necessary. Can be carried in your tool box.

This device will reduce your tire expense two-thirds, and you escape the delay of sending tires to the repair shop. Anybody can operate. Original selling price \$15.00 net. Our price for quick sale \$7.50, as long as they last.

Victor Presto Self-Starters—This starter attaches to your Prest-O-Lite tank, and it can be attached by any garage man at an expense of not over three hours at the outside. These starters adopted by 1913 Maxwell and other cars. Were made up for U. S. Motor's car and not delivered owing to receivership. Former list \$35.00—Sale Price \$5.00.

Must be sold—shipments by express, C.O.D. or send draft with order. Above prices good only while the lots last. Money refunded if not satisfactory.

GEO. H. BOWLER, Agent,
511 Hippodrome Bldg., Cleveland, Ohio.

50 H. P. POPE-HARTFORD ENGINE, USED one season, \$175; new U. & H. T. Magneto, \$25.00; slightly used R. D. Remy Magneto, with coil, \$30.00; one A No. 3 Stromberg carburetor, like new, \$15.00. Pope-Toledo parts for sale. Auto Salvage and Parts House, 1436 Wabash Ave., Chicago.

OXY-ACETYLENE WELDING PLANTS

The Admiral Welding Machine is the ideal welding device; large capacity; self-generating throughout; portable; complete in every detail; a perfect machine for all work, large or small. Send for our booklet, "Welding," and full description. Price, \$200, f. o. b. Kansas City. Admiral Mfg. Co., 715 Lydia Ave., Kansas City, Mo.

PARKINS CARBURETOR, ELECTRIC Horn, Complete Lighting System for Car, Dynamo, Battery, Lamps, Switches, Sockets. Low Prices for Quick Sale. Young, Nyack Ave., Lansdowne, Pa.

PISTON RINGS, ALL SIZES, THIRTY cents each. Merritt Company, 311 W. 59th St., New York City, N. Y.

PLATE THE BRASS ON YOUR CAR WITH silver. Our preparation deposits pure silver over the surface of brass. With little expense you can keep the brass on your car a bright silver color. Simple to use, applied with a cloth. We also have the best nickel polish on the market. Does not wear the nickel off but adds to its luster and durability. \$1.00 per bottle. Enough to plate the brass on your car for one year. Agents wanted. Write today.

Re-Plating Co.,
Box 474, Rochester, N. Y.

RADIATORS—NEW GUARANTEED GOODS

Ford, Model T	\$16
Buick Model 10	22
Buick Model F	25
Chalmers-Detroit	20
Everett	20
Stoddard-Dayton	25
Any other make required at equally low prices.	

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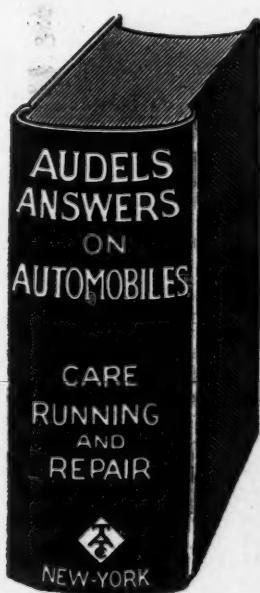
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OF THE
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MATERIAL

Our balls are of a high carbon crucible steel, perfectly hardened and accurately finished, and have a GREATER CRUSHING STRENGTH than others. R. I. V. have been adopted by the leading manufacturers of trucks and commercial cars where ball bearings are subjected to the most severe tests.

Manufacturers have agreed that R. I. V. outpoint all other ball bearings—better constructed, of finer materials and more accurate. They are MADE RIGHT OF THE RIGHT MATERIAL.

Booth No. 605, Madison Square Garden
Booth No. 313, Grand Central Palace

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Imported
Since 1904

1771 Broadway
New York City

"KANT CREEP" INSIDE TIRE



The successful inner tire. Unlike the old liners, the "K. C." completely surrounds the inner tube, reinforcing the casing and giving

**Complete
Protection at
Every Point**

Prevents blowouts, 90% puncture proof, doubles your mileage. Best line for dealers; best line for owners.

Holds on Rim Cut

The only liner that will hold on rim cut tires; the only liner that will not pinch or creep. Write for booklet "The Tire Question" and prices. We sell only through dealers and jobbers.

"Makes every tire a good tire"

Western Tire & Rubber Company
Kansas City, Mo.

**The Days of Tire
Trouble Are Over
for the Knowing Car
Owner Who Will
Have Nothing But**

Firestone

**Quick-Detachable
Demountable Rims**

You need never fear delay in an emergency if you are secured by these time-saving rims. Four or five minutes at the most is needed to change tires.

Figure the worth of this when catching a train, when every minute counts.



**Which
is your
Case?**

Their simple, practical design permits of the exchange of rims with no special tool beyond an ordinary wrench. In case of repeated punctures the tire may be exchanged whether rim is on or off the wheel.

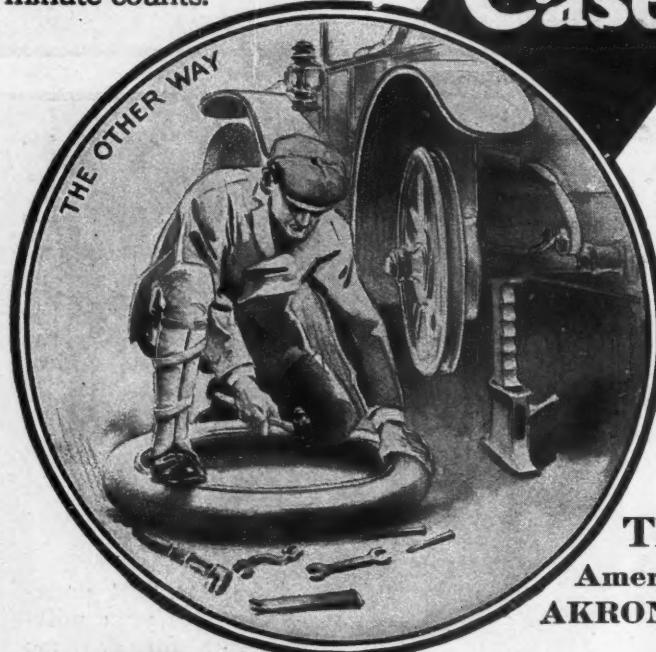
Tires Cannot Be Thrown. When puncture or blow-out occurs, the Firestone rim holds tire securely in place. The valve-sleeve, by preventing valve from slipping out of place, holds metal plate inside tube in regular position. Will not let clincher side ring slip. It is a refinement which means much in safety to every user.

There's Economy as Well. Firestone Rims are made with non-split base. Moisture, dirt and other foreign matter cannot get at the tire to decay and ruin casing or inner tube.

Firestone Rims remove the last "fly in the ointment" of perfect motoring pleasure. Equip your old car with them, and demand them for your new one.

Write for Rim Book

The Firestone Tire & Rubber Co.
America's Largest Exclusive Tire and Rim Makers
AKRON, OHIO " All Principal Cities



Firestone

**Quick-Detachable
Demountable Rims**

For Any Type of Tire—Clincher or Straight Side

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WE CALL your attention here to "Whitney" Cotter Detachable Chains as the most practical chains ever offered for motor vehicles. They have made a record for themselves which no other Detachable Type has approached.

This Cotter Pin feature is so practical and necessary that it calls for little detailed explanation. The illustrations tell their own story, proving that this form of construction is logical and necessary for chain equipped motor vehicles. This Cotter Detachable Chain can be taken apart at any link and lengthened, shortened or repaired without the use of any special tool as the Cotter Pin can be removed with pliers, screw driver or any sharp pointed instrument. The use of Whitney Cotter Detachable Chains assures the builder, owner and driver of commercial vehicles uninterrupted service on account of the ease of repair.

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Write for our illustrated catalog, which shows top and side views of each size of all Roller chains manufactured by us.

"Whitney" Chains are Built for Strains

The Whitney Mfg. Co., Hartford, Conn.



Glide

"36-42" Features

You can't get GLIDE quality, equipment and service in any other car at the GLIDE price. Make us prove it! You can pay more and get less.

Our price includes complete equipment, as follows: Dynamo, Mechanical Tire Pump, Self-Starter, Mohair Top, Top Boot, Glass Front, Electric Headlights, Side Lamps and Tail Lamp, Demountable Rims and One Spare Rim, Model B Stewart Speedometer with Grade Indicator, Spare Tire Carrier. Full quota of tools and jack, all nickel trimmings.

Dealers

The extraordinary quality and equipment of the GLIDE is apparent to the most experienced. It not only sells itself, but every car sells others.

Write for our attractive Dealer's proposition today. Get the GLIDE agency now, while there is still open territory.

The Bartholomew Company
215 Glide Street Peoria, Illinois

The Latest Example of Motor Car PERFECTION

It is far ahead of many 1913 cars—and no car is leading the GLIDE in high-class materials, construction and all of the newest equipment.

The 1913 GLIDE is *electric lighted*—simply turn a button and all lamps are on!

The GLIDE Motor-Driven Tire Pump eliminates drudgery. Also *saves your tires* by keeping them fully inflated at all times to any desired pressure.

Electric Bull's Eye Side Lamps are sunk in dash, eliminating rattling minimizing breakage and adding to the classy appearance.

The GLIDE Self-Starter is *sure of a spark*—investigate and learn why the GLIDE starter is *efficient*.

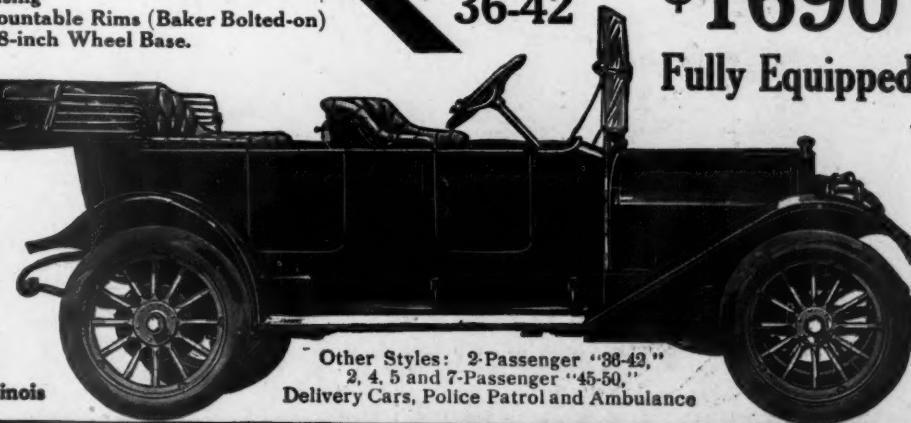
Simple center control, left side drive, demountable rims, irreversible steering gear—and in fact *all* the newest features of known worth—establish the "class" of the 1913 GLIDE.

Make a memo—right now—to write us for detailed description of the entire GLIDE line.

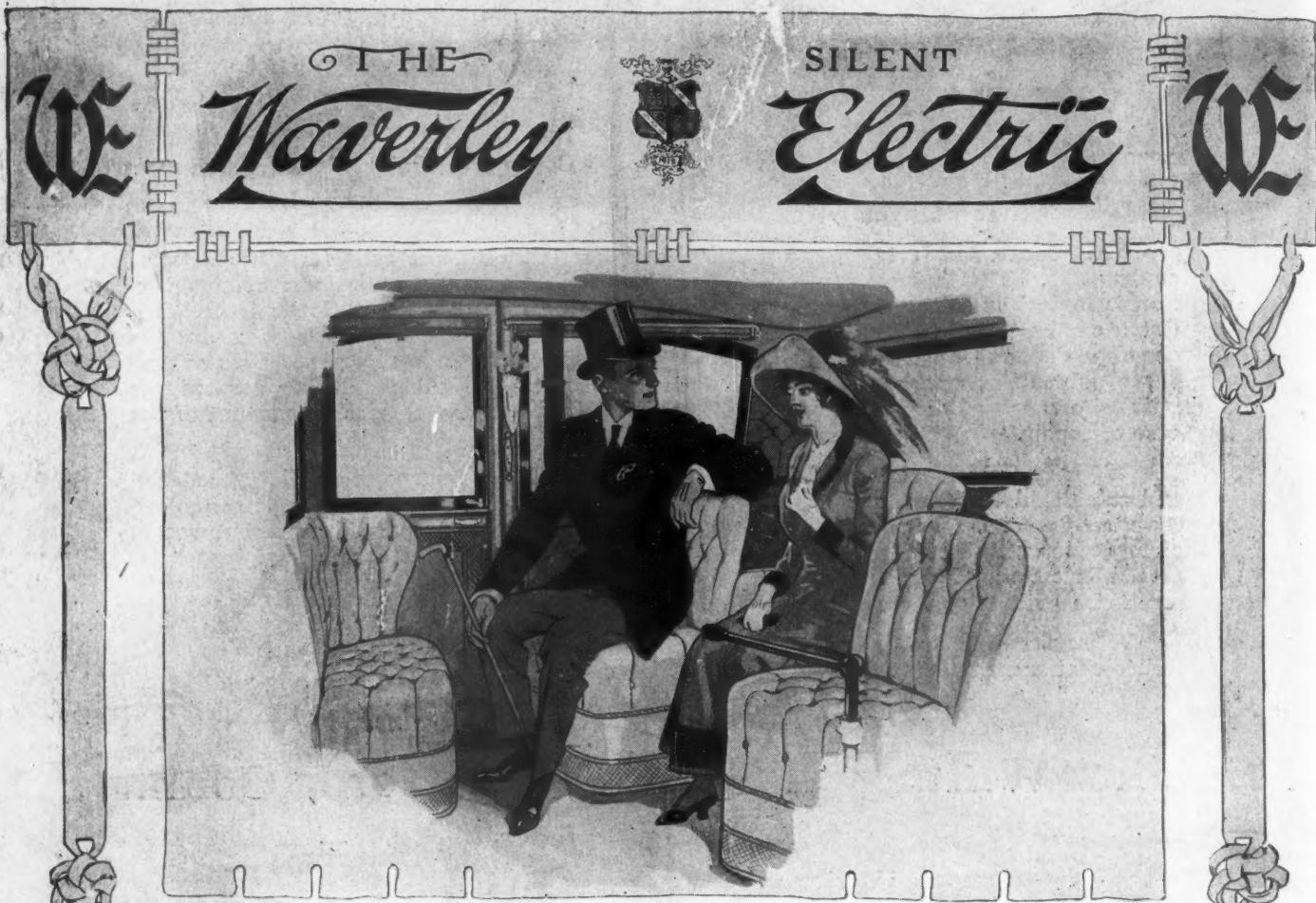
**5-Passenger
"36-42"**

\$1690

Fully Equipped



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2, 4, 5 and 7-Passenger "45-50,"
Delivery Cars, Police Patrol and Ambulance



An Electric That Is Like No Other

Only four-passenger car made with full view ahead drive from the left-hand rear seat

HERE is another big "Scoop" registered for the Waverley Company, originators of the full view ahead electric—the company which designed and built the famous Waverley Limousine-Five, a car which practically all other makers now have copied.

And that is the new Waverley Limousine-Four, a four passenger full view ahead electric—

The only electric that gives this full view from the usual left-hand rear seat—

The pleasant and sociable left hand rear seat that every woman prefers.

The Silent Waverley Limousine-Four

Equipped with four spacious, luxurious Pullman chairs instead of the regular facing seats, the illustration shows the arrangement—how three of these chairs face forward, with the fourth a "cozy corner" in front at the right—

Leaving the space in front of the driver free and clear, while insuring freedom from crowding.

This one feature places the Limousine-Four beyond competition. With the Limousine-Five it makes a team that will gather in the electric vehicle business of your territory for you or some one else.

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